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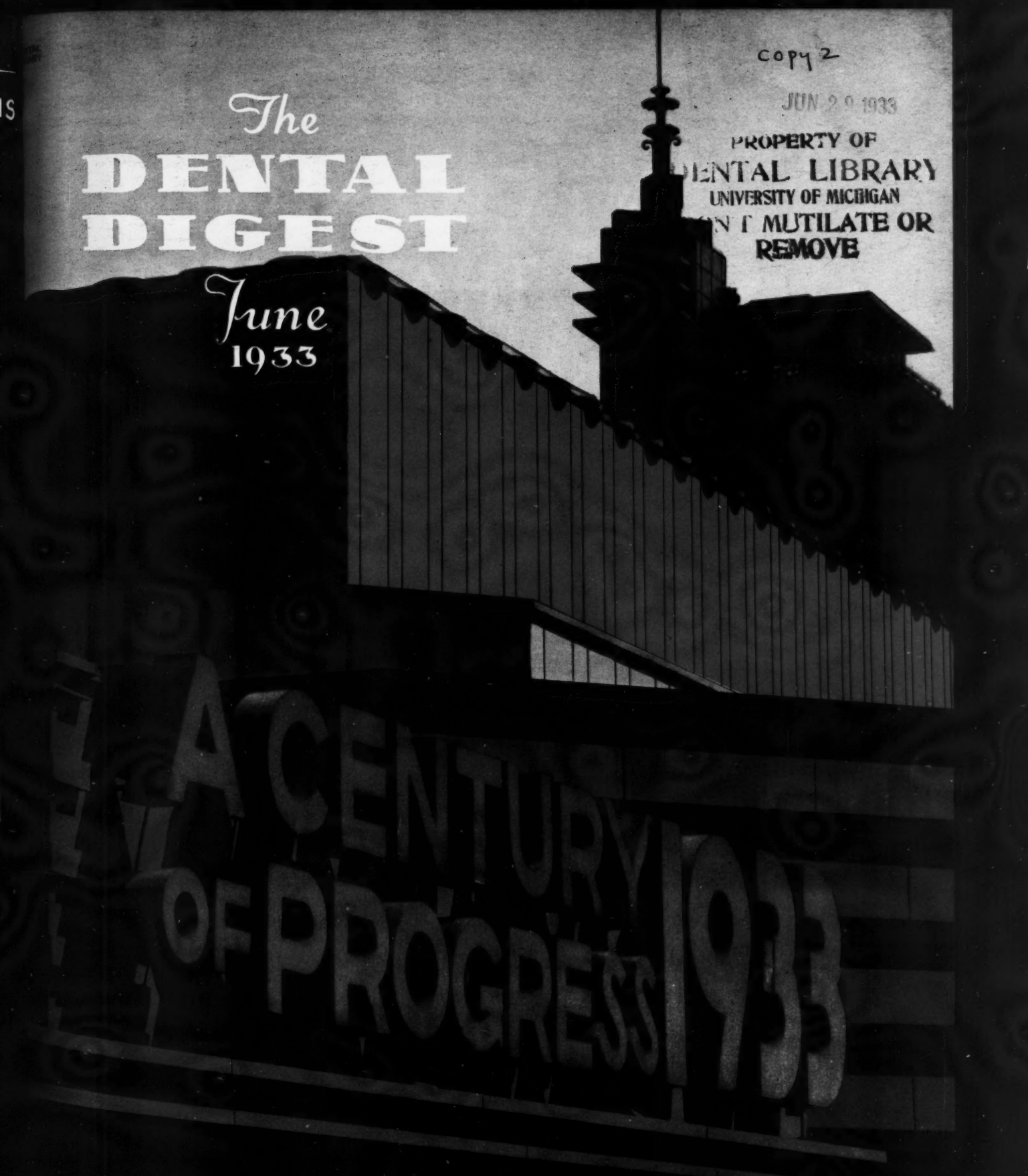
The DENTAL DIGEST

June
1933



THE CHICAGO CENTENNIAL DENTAL CONGRESS

STEVENS HOTEL, AUGUST 7-12, 1933

AMERICAN DENTAL ASSOCIATION SEVENTY-FIFTH ANNUAL SESSION

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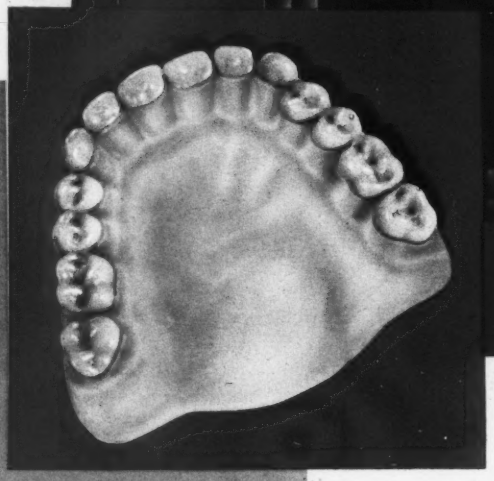

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The DENTAL DIGEST

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SALIVARY CALCULUS OF THE SUBMAXILLARY GLAND

REPORT OF CASE

IRVING SALMAN, D.D.S.
New York

A MAN, aged 26, was referred by his brother, a dentist, for diagnosis and treatment, January 8, 1932, the patient presented himself because of a swelling at the angle beneath the border of the mandible.

Previous History—The patient had had recurrent swellings in the left submaxillary region for the past eight or nine years. This region swelled about five times during this period and appeared when the patient had a cold. The area was slightly tender to touch; otherwise it gave no discomfort. The duration of the swelling was about the same as that of the cold, and therefore, the patient associated it with his condition and never before applied for diagnosis or treatment.

Present History—The last swelling appeared about the beginning of December, 1931. The patient noticed that it would become enlarged whenever he took any nourishment, and would subside after a day or so, but never entirely disappear. His brother at this time suspected the possibility of an obstruction in the duct and advised the patient who was working at a hospital in this city to have roentgenograms taken. A postero-anterior roentgenogram (Fig. 1) was accordingly taken, but a definite diagnosis, however, could not be made from it. About one week later the patient's brother took a lateral roentgenogram, left side, 5 by 7 (Fig. 2), which revealed the presence of a foreign object in the region of the second molar.

Fig. 1—Postero-anterior roentgenogram taken to show foreign object in submaxillary region.

Extra-Oral Examination—The patient had an enlargement of the submaxillary region. This swelling was about the size of a walnut. The mass was hard and movable and slightly tender to palpation. There were no other glandular involvements that could be felt either in the neck or the axillary region.

Intra-Oral Examination—The hygienic condition of the mouth was excellent. There was only one tooth missing, the lower left first molar. The teeth on the left side responded normally to the galvanic vitality test. The mucous membrane, both buccally and in the floor of the mouth on the left side, was normal. By extra-oral and intra-oral palpation of the submaxillary region a hard movable mass could be felt.

Roentgenographic Interpretation—Fig. 1 is a postero-anterior roentgenogram taken at a hospital to show the presence of any foreign object in the submaxillary region. Unfortunately, in this type of roentgenogram, the presence of any stones in this region might not be disclosed because of overlapping by the vertebral column, as shown by arrows.

Fig. 2 is a lateral roentgenogram of the left side which clearly shows a calcific mass extending 0.5 cm. below the border of the mandible. This mass measured 2.5 cm. in length by 1 cm. at its widest portion.

Fig. 3 is a number 2 bite film or occlusal film used for localization of the object. This type film should always be used for a differential diagnosis, particularly when the lateral plate roentgenogram would make objects similar to this appear in the body of the mandible (Fig. 4). The occlusal film will show calculi in the soft tissue and localize its position. In this roentgenogram one sees the calculus

Fig. 2

Fig. 5

Fig. 3

Fig. 4

Fig. 1—Postero-anterior roentgenogram taken to show foreign object in submaxillary region.

Fig. 2—Lateral roentgenogram, left side, showing calcific mass below second molar.

Fig. 3—Occlusal roentgenogram (number 2 bite film) taken for localization and for differential diagnosis. Stone shows in upper right corner.

Fig. 4—Lateral roentgenogram showing three pieces of salivary calculus in posterior third of Wharton's duct. The objects appear here to be in the body of the mandible and not in the soft tissue as an occlusal roentgenogram would show them. This roentgenogram is of another case to show the possibility of making a wrong diagnosis.

Fig. 5—Lateral roentgenogram following operation.

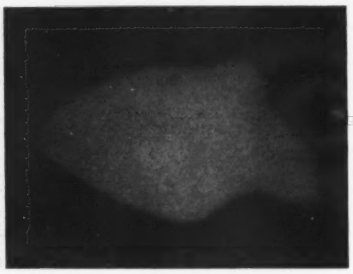

Fig. 6—Roentgenographic appearance of stone after removal.

in the soft tissue and in its proper position. The stone is about 1 cm. posterior to the third molar, and not directly beneath it as the lateral plate shows it. Its position was too far back to show the whole object in the roentgenogram but one corner could be discerned.

Fig. 5 is a lateral plate roentgenogram which was taken following the removal of the stone, and Fig. 6 is a roentgenogram of the stone itself after removal.

Operation—Under local anesthesia, the lingual nerve having been injected, an incision was made in the floor of the mouth about 2.5 cm. in length from the third molar region back. By blunt dissection the submaxillary gland was exposed. By compressing the submaxillary region extra-orally the stone could be palpated intra-orally. The pressure being maintained from the outside the tissue was dissected, the stone thus being exposed half its length. A spoon curet was then passed downward and underneath the calculus, and by upward pressure the stone was dislodged. To have tried to grasp this stone with any instrument would only have crushed it and made it practically impossible to remove it in its entirety except by complete excision of the gland, a procedure that requires an extra-oral incision. The lips of the wound were coaptated. No sutures were inserted.

Subsequent Treatments—The postoperative treatment consisted of hot saline irrigations every hour with the use of a 2 quart douche bag and cold external applications. The swelling completely subsided within a period of two days.

The operation was performed on January 8, and on January 11 there was no external swelling. The tissue in the floor of the mouth was slightly hyperemic. Little discomfort was felt. The lips of the wound closed by a primary union. The patient complained of slight numbness of the side of the tongue.

January 13 the intra-oral tissue was normal, and no further treatments were given.

January 15 the submaxillary region was slightly enlarged. The patient developed a cold. The tissue of the floor of the mouth was normal.

January 17 the swelling subsided.

February 8, on examination there was still some numbness of the side of the tongue, about 2 cm. in length. There was no paresthesia on the lingual surface of the mucous membrane. This numbness is due to severing some small fibers of the lingual nerve. There was no further recurrence of symptoms.

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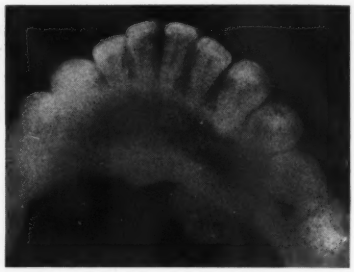

Fig. 7—Occlusal roentgenogram of salivary calculus at orifice of Wharton's duct. Roentgenogram is of another case, but reproduced here to show how salivary calculus appears on an occlusal view.

Comment

When the salivary calculi are in the anterior two thirds of the duct or in the sublingual gland, the best approach is by way of the mouth. When their presence are in the posterior third of Wharton's duct or in the submaxillary gland proper, the method of approach is left to the operator's judgment. I believe that when the calculi are readily demonstrated roentgenographically and particularly when they can be felt by intra-oral and extra-oral palpation, the intra-oral route should have the preference, thus preventing the possibility of a salivary fistula.

When there are several minute stones, however, or numerous calcific deposits as are seen in tuberculous glands, the best procedure is through an extra-oral incision and by the removal of the entire gland; the formation of a salivary fistula is thus avoided.

LETTERS TO THE EDITOR

Burning Mouth

We have an unusual case about which we would like to ask you. A woman, aged 60, came to us because of a burning mouth. She said she had noticed this since July, 1932. The lips are dry and there seems to be a temperature inside which seems to affect the lips and cheeks rather than the gums. She has been taking a prescription of hydrochloric acid for acid of the stomach for several years. This was prescribed by the patient's physician. We advised the use of a proprietary mouthwash, three or four times a day, and quantities of fruit juices to be taken during the day. We also advised the use of a milk of magnesia toothpaste. The burning sensation in the mouth has not been relieved after a period of two months. The patient uses snuff and chews gum occasionally. The teeth and gums are in good condition.

W. L. M., D.D.S., Texas.

Answer—The case described is relatively unusual. Because the mouth is in a good hygienic condition, one must look further for the cause. In considering diseases related to the fifth cranial nerve the potential causes must be divided into three groups: (1) disease of the peripheral branches, (2) diseases of the brain, (3) systemic conditions and reflected impulses.

1. Diseases of the peripheral branches of the fifth nerve seldom involve both sides of the face, rarely affect the cheeks and lips only, and are more commonly associated with pain which may be more or less severe.

2. Diseases of the brain may affect both sides of the face but not necessarily so. They are not infrequently associated with other symptoms of brain involvement or systemic manifestations. Syphilis should not be overlooked in this connection.

3. Systemic diseases, such as the anemias. gastric conditions, and leukemias, more frequently involve the tongue instead of the cheeks and lips, but such conditions should be ruled out or considered possible causes.

A decrease in the amount of saliva excreted (xerostomia) is found associated with burning cheeks and lips, but not necessarily marked heat production. This condition is not infrequently found in patients of advancing years who are the victims of arteriosclerotic changes which decrease the activity of the nuclei of the brain, especially those supplying nerve fibers to the salivary glands. Vasomotor disorders should be considered as possible causes. No treatment is satisfactory.

One of the most common causes of the condition described is based on psychneurotic tendencies. These patients are often found to be living in an unhappy environment. I have seen two such patients within the last few months and each recovered temporarily while on an enforced vacation from their homes.

Carroll W. Stuart, M.D., D.D.S., Chicago.

I have been getting a copy of The Digest off and on as there are one or two that come into the office, but when I am away from home someone else gets them first.

I think The Digest is the finest dental magazine published at the present time and I am grateful to you for making it possible for me to get a copy of it regularly each month.—F. J. Fifield, D.D.S., *St. Paul.*

WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

IV. FIELD STUDIES IN PRIMITIVE AND IN MODERN OUTER HEBRIDES, SCOTLAND

WESTON A. PRICE, D.D.S., M.S., F.A.C.D.
Cleveland, Ohio

THE previous reports of the results of field studies in which a search was made to find communities with high immunity to dental caries have included only inland districts of Switzerland. All the districts reported as providing a high immunity were at altitudes of several thousand feet. It has been shown, however, that altitude was not the controlling factor since St. Moritz with its low immunity to tooth decay is at a high altitude similar to the districts in the Loetschental valley; Grachen and Visperterminen of the Visp valley; and Ayer of the Anniveries valley all in the Canton of Wallis (Valais). Herisau in the lower plains district of Switzerland, near Lake Constance, at an altitude of about a thousand feet, was also shown to have a low immunity to tooth decay. The characteristics that have been found to be controlling factors have been (1) physical isolation such as to compel the residents of favorable districts to depend practically entirely on locally produced foods, primarily because of the difficulty of shipping modern foods into those communities, and further, (2) that as rapidly as transportation facilities developed sufficiently to permit the ingress of modern foods, immunity was lost. The basic foods of the groups found to have a high immunity in Switzerland were rye and dairy products with little fruit and a limited amount of green vegetables which were restricted largely to the summer time. Meat was eaten about once a week. We are immediately confronted with the question as to whether the factors that provide immunity are restricted to rye and dairy products or whether other combinations of foods may be equally effective. This has indicated the need for similar studies to be made of districts at ocean level where entirely different basic foods are available.

Accordingly a study was made of islands that were sufficiently isolated to compel the inhabitants to depend on their primitive natural foods. Among such islands are the Outer Hebrides lying off the northwest coast of Scotland and extending to a latitude almost as far north as the southern part of Greenland. The studies to be recorded herewith are, therefore, chiefly of some districts in the Outer Hebrides.

The Isle of Lewis has a population of about 20,000 people made up almost entirely of fisher-folk and crofters or sheep raisers. The island has so little lime in its soils that it is said that there is not a tree in the entire island except a few that have been planted. The surface of the island is largely covered with peat varying in thickness from a few inches to 20 feet. This peat, which furnishes the fuel, still contains the rootlets of the plant life that grew many centuries ago. There is so little bacterial growth that vegetable products undergo slow decay. The pasturage of the island is so poor that few cattle are to be found, largely because they do not properly mature and reproduce. In a few districts some highland cattle with long shaggy hair and horns that are wide apart are grown, but these are for the most part imported. The principal herd of cattle on the island consists of a few dozen head in the government experimental farm. The basic foods of the islanders are fish and oat products and a little barley. Oats is the one cereal that develops fairly readily and it provides the porridge and oat cakes which in many homes are eaten regularly in some form with each meal. The fishing around the Outer Hebrides is especially favorable and small sea foods including lobsters, crabs, oysters, and clams are abundant. An important and highly relished article of diet has been baked cod's head stuffed with chopped cod's liver and oat meal.

The principal port of the Isle of Lewis is Stornoway with a fixed population of about 4000 and a floating population of seamen over week ends of an equal or greater number. The Sunday we were there, there were

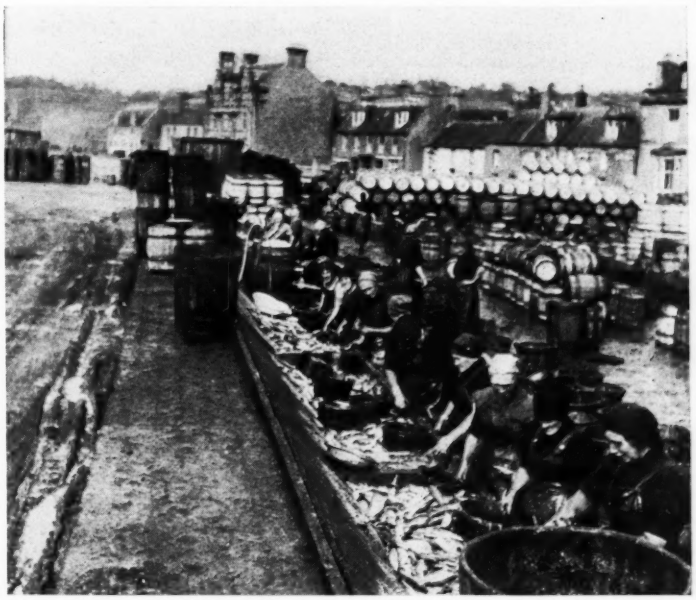

Fig. 1—Stornoway, the seaport of the Isle of Lewis, provides barrels of fish for world markets. It is in the region of long summer days.

said to be 450 large fishing boats in the port for the week-end. Large quantities of fish are packed here for foreign markets. A typical dock scene is shown in Fig. 1. These hardy fisherwomen often toil from 6 o'clock in the morning to 10 o'clock at night. The abundance of fish makes the local cost low.

It would be difficult to find examples of womanhood combining a higher degree of physical perfection and more exalted ideals than these weather-hardened toilers. Theirs is a land of frequent gales, often sleet-ridden or enshrouded in penetrating cold fogs. Life is full of meaning for characters that are developed to accept as everyday routine raging seas and piercing blizzards representing the accumulated fury of the treacherous north Atlantic. One marvels at their gentleness, refinement and sweetness of character.

The people live in what have been called black-houses. These are thatched-roof dwellings containing usually two or three rooms. The walls are built of stone and dirt usually about 5 feet in thickness. There is usually a fireplace and chimney and one or two outside doors and few windows. The thatch of these houses plays an important rôle. It is replaced each October and the old thatch is believed by the natives to have exceptional value as a special fertilizer for the soil, because of its impregnation with chemicals that have been obtained from the peat smoke which is seen seeping through all parts of the roof at all seasons of the year. Peat fires are kept burning for this explicit purpose even when the heat is not needed. This means that enormous quantities of peat are required to maintain a continuous smudge. Some of the houses do not have a chimney because it is considered desirable that the smoke leave the building through the thatched roof. Not infrequently is smoke to be seen rolling out of an open door or open window. Fortunately the peat is so abundant that it can easily be obtained in almost limitless quantities nearby. The sheep that roam the heather-covered plains are a small, black-faced variety with great hardihood. They provide a wool of specially high quality which, incidentally, is the source of our famous Harris Tweeds which are woven in these small black-houses, chiefly on the Isle of Harris.

We are particularly concerned with the people of early Scotch descent who possess a physique that rivals the product of any place in the world. They are descendants of the original Gaelic stock whose language is their language today, and the only language that a large percentage of them can speak. This island has only one port which means that most of the shoreline still provides primitive living conditions as does the central part of the island. It was a happy surprise to find such a high type of manhood and womanhood as make up the occupants of these rustic thatched-roof homes, usually located in an expanse of heather-covered treeless plains. It would be hard to visualize a more complete isolation for childlife than many of these homes provide which makes one marvel at the refinement and splendid intelligence and strength of character of these rugged people. They resent, and I think justly so, some critical and uncomplimentary references to their homes which have been given the name of "black-houses." Several that we visited were artistically decorated with clean wall paper and improvised hangings.

One would expect that in their one seaport town of Stornoway things would be gay over the week-end if not boisterous with between four and five thousand fishermen and seamen on shore-leave from Saturday until midnight Sunday. On Saturday evening the sidewalks were crowded with happy carefree people but no boisterousness, drinking or vulgarity were to be seen. Sunday saw the people going in throngs to their various churches and all in a serious mood. Before the sailors went aboard their crafts on Sunday evening they met in bands in the street for religious singing and prayers for their safety on their next fishing expedition. One could not buy a postage stamp or picture card or find any place of amusement open on Sunday, nor could a taxi be hired or a newspaper purchased on the street. Everybody has reverence for the Sabbath day on the Isle of Lewis. Every activity is subservient to their observance of the Sabbath day. No one could witness their simple devotion to their ideals without profoundly honoring their strength of character. In few places in the world are moral standards so high, or is the spirit of love and charity and brotherly regard more beautifully expressed than in their kindness to strangers and the high esteem in which womanhood is held. One wonders if the bleak winds which thrash our north Atlantic from the Labrador and Greenland coasts have not tempered the souls of these people to create in them higher levels of nobility and exalted expression. These people are on the outposts of the western fringe of the European continent.

Just as one sees in Brittany on the West coast of France, the prehistoric druidical stone forests marking a civilization that existed so far in the past as to be without historic records except in its monuments, so too does one find here the forest of granite slabs in which these sturdy prehistoric souls worshipped their divinities before these people were crowded into the sea by the westward moving hordes. When one realizes the distance from which these stones had to be transported, probably at least twenty miles over difficult terrain, one can appreciate the task, particularly if one calculates their size according to the depth to which they must be buried in order to stand so erect and tall to this day.

We are concerned primarily, however, with the physical development of the people and particularly with their freedom from dental caries. One has only to see them carrying their burdens of peat or observe the ease with which the fisherwomen on the docks carry their tubs of fish back from the cleaning table to the tiers of packing barrels to be convinced that these people have not only been trained to work but have physiques equal to the task. The studies of these people included dental examinations, photographs, obtaining samples of saliva for chemical analysis, obtaining mouth cultures, detailed clinical records, samples of food for chemical analysis, and detailed nutritional data.

Communication between the various islands is difficult in many of these districts, because more complete isolation than some of them provide would be hard to find. We tried to get to the islands of Taransay and Scarpa on the west coast of the Isle of Harris but were unable to obtain transportation which can only be done with seaworthy special crafts. The crafts will only undertake the passage at certain phases of the tide and direction of the wind. On one of these islands we were told the growing boys and girls had exceedingly high immunity to tooth decay. Their isolation was so complete that a young woman of about 20 years of age who came to the Isle of Harris from Taransay Island had never seen milk in any larger quantity than drops. There are no dairy animals on that island. Their high immunity is provided by their oat products and fish and limited supply of vegetables. Lobsters and flatfish are important items in the diet. Fruits are practically unknown.

It was necessary sometimes for us to engage skilled seamen and their

crafts to make a special trip to take Mrs. Price and our interpreter and me to some of these isolated islands. These seamen watch critically the tide and wind and sky and determine the length of time it will be safe to travel in a certain direction because of the speed of the running tide and the periodic change of the wind. Some of these islands are isolated by severe weather conditions for many weeks at a time.

These islands have been important in the whaling industry even until recent years. We visited a whaling station on the Isle of Harris, not active at this time, where the monsters of the sea were towed into a deep bay. The marketable products were collected for distribution.

In the interior of the Isle of Lewis the teeth of the growing boys and girls had a high degree of perfection with only 1.3 teeth out of every hundred examined that had even been attacked by dental caries. It will be interesting to see the figures obtained from an analysis of their nutrition and of their saliva which will be discussed in the succeeding installment of these studies.

There are some lessons to be learned from these communities for surely this section would suffer from dental caries if either a preponderance of alkaline or a liberal vitamin C were requisites to a high immunity to tooth decay. Surely few diets can be found more acid-producing than the oat products and fish that are nearly the sole source of nutrition here.

An important part of the study of these islands consisted in critically observing what occurred at the fringe of civilization. A typical cross section of the residents of their seaport town of Stornoway were seen assembled on the docks to greet the arrival of the evening boat, the principal event of the community. This group was made up largely of adult young people. In a count of a hundred persons appearing to be between the ages of 20 and 45, twenty-five were already wearing artificial teeth and as many more would have been more presentable had they too been so equipped. Dental caries was rampant in the modernized section of Stornoway. Since an important part of these studies involved a determination of the kind and quantities of foods eaten, it was necessary in practically every place studied to visit the sources available for purchasing foods. In Stornoway one could purchase angel food cake, white bread as snow white as in any community in the world, many other white flour products, and canned marmalades,

Fig. 2—These boys are brothers and eat at the same table. The younger, to the left, has rampant tooth decay; he lives on modern foods. The other, on the right, has excellent teeth; he lives on the native diet.

canned vegetables, sweetened fruit juices, such as jams, confections of every type filled the store windows and counters. These foods probably made a great appeal to the palates of these primitive people both because of their variety and their high sugar content. The difference in physical appearance of the childlife of Stornoway from that of the interior of the Isle of Lewis is more striking than one would conceive possible, nor indeed were the destructive effects limited to this seaport town. We found a family, for example, on the opposite coast of the island where the two boys shown in Fig. 2 resided. One of these brothers had excellent teeth and the other had rampant caries. They ate at the same table. The older boy with excellent teeth was still enjoying primitive food of oat meal and oat cake and sea foods with some limited dairy products. The younger boy, shown at the left, had rampant tooth decay. Many teeth were missing including two in the front. He was having his food largely sent in by mail from the distant port. He insisted on having white bread and jam and highly sweetened coffee and also sweet chocolates. His father told me with deep concern how difficult it was for the boy to get up in the morning and work, whereas his older brother was physically so much stronger.

One of the sad stories of the Isle of Lewis has to do with the recent rapid progress of tuberculosis. The younger generation of the modernized part of the Isle of Lewis is not showing the resistance to tuberculosis that their ancestors did. Indeed a special hospital has been built at Stornoway for the rapidly increasing tuberculous patients, particularly for women between 20 and 30 years of age. The superintendent explained to me with deep concern the rapidity with which this menace was growing. I was surprised to find that little consideration was apparently being given to the change in nutrition as a possible explanation for the failure of this generation to show the defense of previous generations against pulmonary tuberculosis. Formerly it was rare. In this connection much blame had been put on the housing conditions, because it was thought that the thatched-roof house with its smoke-laden air was an important contributing factor notwithstanding the freedom from this disease in former generations.

Large numbers of the people had been induced with the financial assistance of the British Government to build modern homes and abandon the open peat fireplace and thatched roof. I was told that the incidence of tuberculosis was frequently the same in the modern homes as it was in the thatched-roof homes. It was of special interest to observe the attitude of mind of the native with regard to the thatched-roof house. Over and over we saw the new house built beside the old one and the people aparently living in the new one but still keeping the smoke smudging through the thatch of the old thatched-roofed house. When I inquired regarding this I was told by one of the clear thinking residents that this thatch collected something from the smoke which when put in the soil doubled the growth of plants and the yield of grain. He showed me with keen in-

terest two patches of grain which seemed to demonstrate the soundness of his contention. I brought some of this thatch and grain with me for chemical analysis. The results have been spectacular and will be discussed in another communication.

I was particularly interested to study the growing boys and girls at a place called Scalpay in the Isle of Harris. This island is rocky and has only small patches of soil for available pasturage. For nutrition the children of this community were dependent largely on oat meal porridge, oat cake and sea foods. An examination of the growing boys and girls disclosed that only one tooth out of every hundred examined had ever been attacked by tooth decay. Their physical development was excellent as will be shown later.

This is in striking contrast with the children of the hamlet of Tarbert which is the only shipping port on the Isle of Harris. This is the principal export port of the famous Harris tweeds which are manufactured on looms in the crofters' homes. Of every hundred teeth examined in these Tarbert children there was an incidence of 32.4 teeth already attacked by dental caries. The distance between these two points, Scalpay and Tarbert, is not more than ten miles and as both are on the coast they have equal facilities for obtaining sea foods. Only the latter, however, has access to modern foods since it supports a white bread bakery store with modern jams and marmalades and canned foods of various kinds. In studying the tragedy of rampant tooth decay in the mouth of a young man I asked him regarding his plans and he stated that he was expecting to go to Stornoway about sixty miles away in the near future, as there was a dentist there and he would have all his teeth extracted and plates made. He said there was no use in having any teeth filled because he would have to lose them anyway since that was everybody's experience in Tarbert. The same condition prevailed among the young women.

We made a journey to the extreme western part of the Isle of Harris hoping to engage transportation to the Island of Scarpa to which I have referred, but the sea was too rough and the trip could not be made. I was advised that only a few years ago there was not a single decayed tooth among the growing boys and girls of this island, but now, since the establishment of weekly postal service and commerce, dental caries had become rampant. On inquiry we found that modern foods including refined flours were displacing the native natural foods of oat and fish products.

Through the department of dental inspection for north Scotland I learned of a place on the Isle of Skye, Airth of Sleat, in which only a few years ago there were thirty-six children in the school and not one case of dental caries in the group. My examination of the children in this community disclosed two groups, some living largely on modern foods and the other group living on primitive foods. Those living on primitive foods had only 0.7 teeth that had ever been attacked by caries per hundred examined, while those in the group living on modern foods had 16.3 or twenty-three times as many as those on primitive foods.

This community living near the sea had recently been connected with the outside world by daily steamboat service which delivered to the people modern foods of various kinds and with it we found there had been established a modern bakery and facilities for purchasing the canned vegetables, jams and marmalades. This district was just in the process of being modernized.

I examined teeth of several people in the seventies and eighties and except for gingival infections with some loosening of the teeth almost all of the teeth were present and there was little evidence that dental caries had ever existed. The elderly people were bemoaning the fact that the new generation that was growing up did not have the health of former generations. I asked what their explanation was and they pointed to stone grinding mills which they said had ground the oats for oat cake and porridge for their family and preceding families for at least two hundred years. Though they prized them highly the plea that they would be helpful in educational work in America induced them to consent to selling them. Two of these old people are shown with their son in Fig. 3 sitting in front of an abandoned primitive home with a pair of mill stones beside them which I brought back with me. Note the wonderfully fine physique of the son. He told us with great concern of the recent rapid decline in health of the young people of this district.

A splendid illustration of the promptness with which long established customs are abandoned when commerce makes modern food products available is seen in Fig. 4, in which is shown two views of an abandoned grist mill on the West Coast of the Isle of Lewis. The power had been provided by a small stream which rotated one stone on another. This mill was used for grinding oats. It quickly went into disuse when the grain products as produced by the modern steel roller process became available by import.

This one-time well populated island, the misty Isle of Skye, still has one of the finest of the famous old castles built by the stalwart men of the Dunvegan clan. This castle figured in the romantic life of Prince Charlie. The castle equipment still boasts the grandeur of a past glory. Among the relics is a horn which measured the draft to be drunk by a prospective chieftain before he could aspire to the leadership of the clan. He must drink its contents of two quarts without stopping. Again the character of that race is reflected in the fact that although a bounty of thirty thousand pounds was placed on the head of Prince Charlie for anyone who would reveal the place of his

Fig. 3—Two generations of people who have always had high immunity to tooth decay. The grandchildren have rampant decay. The round stones are a primitive household grist mill.

Fig. 4—Two views of an abandoned grist mill on the West Coast of the Isle of Lewis. This is a splendid illustration of the promptness with which long established customs are abandoned when commerce makes modern food products available. This mill was used for grinding oats.

hiding, which many knew, not one could be found who would betray him.

On my return from the Outer Hebrides to Scotland I was concerned to obtain information from government officials relative to the incidence of tooth decay and the degenerative diseases in various parts of north Scotland. I was advised that in the last two generations the average height of Scotch men had in some parts decreased 4 inches and that this had been coincident with the general change from high immunity to dental caries to a loss of immunity in a large area of this general district. A study of the market places revealed that a great deal of the food was shipped into the district in the form of refined flours and canned goods. There were few herds of dairy cattle to be seen. It was explained that even the highland cattle did not do so well as formerly on the same ranges.

As one proceeds from the north of Scotland southward to England and Wales there is a marked increase in the percentage of persons wearing artificial restorations or in need of them. In several communities studied this reached 50 per cent of adults over 30 years of age. An effort was made to find primitive people in the high country of Wales, but without success. We were advised that about the only place that we would be likely to find people living under primitive conditions would be on the Island of Bardsey off the northwest coast of Wales. This is a rock-bound and stormy island with the decadent walls of an old castle and a community made up largely of recently imported colonists whom we were advised had been taken to the island to repopulate it. There is considerable good farm land but limited grazing stock. Formerly the island with the fishing around it had produced the foods for its inhabitants. These sources of natural foods have been largely displaced with imported white flour, marmalades, jams, and canned goods. We found the physical condition of the people poor, particularly that of the growing boys and girls. Tooth decay was rampant, so much so that 27.6 out of every hundred teeth examined had already been attacked by dental caries in the growing boys and girls. It was even active in three year old children. These children will be referred to later in connection with the studies made of facial deformities associated with these nutritional disturbances. From a conference with the Director of Public Health of this district I learned that tuberculosis constituted an enormous problem not only for the people on this island but for many districts of northern Wales. This was ascribed to a lowered defense of the people from causes unknown. It had been noted that persons with rampant tooth decay were more susceptible to pulmonary tuberculosis.

While on the Island of Bardsey I inquired as to what they thought was the cause of such extensive tooth decay as we found. I was advised that they were familiar with the cause and that it was due to close contact with the salt water and salt air. When I asked why many of the old people who had lived by the sea all their lives in some districts still had practically all their teeth and had never had tooth decay no explanation was available. This, they said, was the reason that had been ascribed in answer to their inquiries. A visit to the school dental clinic of Swansey in southern Wales revealed an active service splendidly organized but which consisted almost exclusively, as explained by the operators, in extractions. I was particularly concerned to know whether the depression of this formerly busy center was affecting the people that were poor more than those that had means. I was interested to be advised that the children of the men living on the dole, although they had extensive tooth decay were not so seriously affected as the children of the better classes.

The Director of Public Health of that city and district was concerned regarding the progressive increase in the incidence of dental caries such that the teeth of almost every person were seriously attacked, making artificial restorations a common occurrence in adults.

Unfortunately space does not permit including here detailed information relative to the association of physical deficiency expressions, including facial deformities with the incidence of dental caries and the relation of both to nutrition. This has been discussed in another communication and will be reviewed in the next installment. The chemical analyses of the samples of saliva obtained from these people produced important data which will also be reported.

The fifth installment of these studies will deal with practical procedures for the nutritional control of dental caries.

(End of Fourth Installment)

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SURGICAL REMOVAL OF THE FIRST BICUSPID: TECHNIQUE FOR AVOIDING A FLAP ON CUSPID EMINENCE

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IN laying a flap for surgical removal of the first bicuspid, upper or lower, and the upper lateral incisor, one is sometimes confronted with a serious handicap in the presence of thin tissue of the upper and lower cuspid eminences. In some cases this tissue is thin and the process covering the root of the tooth is either almost absent or thin as paper. A flap laid in the usual way in these cases will necessitate placing a suture in thin tissue and trying to approximate the edges of the same kind of tissue, with the result of "cut out" sutures and poor union. Healing will necessarily be slow and a scar will usually be in evidence.

Fig. 1 shows the location of the incision to be made in these cases without disturbing the thin tissue on the cuspid eminence.

In outline of incision I prefer the Cogswell method[1] rather than the circular incision, and I prefer to give plenty of room for a base on which to rest the flap when replaced. The blood supply is not destroyed then; at least, no more so than if the flap were taken from over the cuspid.

Fig. 2 shows the flap retracted. Plenty of room is given for operation, and one will note the depth of tissue where incision is to be approximated. The danger of "tear" is minimized, and approximation is assured.

In the lower bicuspid region one must be careful of the mental foramen area; but this care must also be taken if the flap is taken from over the cuspid.

Fig. 3 shows the flaps replaced and sutured. One or more sutures may be used.

The angle method of incision gives a definite marking for replacing tissue in the proper position.

In a few instances on the upper, perhaps, the suture can be dispensed with; however, it is my opinion that a suture will be more certain to keep the flap in position than a blood clot and pressure from the lip.

Sutures may be of horse hair or No. 000 ethicon suture. These sutures may be removed in from three to five days.

[1]Cogswell, W. W.: Dental Oral Surgery, Pittsburgh, Dental Digest, Inc., 1932.

Wade Building.

Fig. 1—Location of incision in cases of thin tissue of the cuspid eminence.

Fig. 2—Flap retracted.

Fig. 3—Flaps replaced and sutured.

A NEW THERMOPLASTIC DENTURE TECHNIQUE

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SINCE I began to work with thermoplastic materials when they first were introduced to the profession, I have endeavored to develop a technique that would allow the work to be done speedily and accurately, and in a manner consistent with good dentistry.

Some of the inherent characteristics of the materials evolved for use in artificial denture work have led to difficulties when not understood and mastered. This was true of vulcanite when it was first used by dentists. Plates were warped, or they were too porous, or they caused sore mouths; or other disadvantages appeared to place the material in disfavor. The failure experienced, however, did not stop the material from being increasingly used until it became the most universally used base for artificial teeth. In the last ten years, new materials have appeared in increasing numbers, and I think that rubber as a denture base is doomed. The public usually gets what it wants, and it appears to want a more perfect dental restoration than a rubber plate.

When the pyroxylene blanks first appeared on the market, they created a stir; many dentists turned to them and extolled their virtues to the public. The dentist himself was frequently disappointed in results, and many experienced so much grief that they turned back to rubber. A large share of this difficulty is due to lack of understanding of the material and consequent abuse of it.

A denture properly pressed on a hard model fits perfectly in every detail when made. The pressure used when plastic causes it to seek out every little detail. I have shown this by making initials on the cast so small they can barely be read, and they always appear on the denture. When the denture is pressed it fits perfectly; but from the time the flask is cooled difficulty arises. Experience has taught me the necessity of proper removal from the flask and proper handling until it is placed in the mouth. It is always advisable to remove the denture from the flask in such a way that it stays on the cast; then, to trim away excess and finish it down while still on the cast. This is a safeguard against overheating and warping in polishing. Dentures should never be allowed to remain around the office for any length of time without first applying vaseline to the case and flowing plaster around it as a matrix to prevent change. I think that the laboratories in shipping cases should do this also. It is better to place cases in the mouth the same day they are pressed. If dentures fit the cast perfectly when made, they will also fit the mouth; but it is necessary to take proper care of the denture in the intermediate stages between pressing and placing in the patient's mouth.

The newer materials available now for making casts of sufficient crushing strength to withstand ordinary demands in pressing cases are helping to overcome difficulties in this work. A denture can be made by an experienced operator with ordinary dental plaster, but thin ridges may even then break down. All casts should be made of the newer stones, such as are now available.

I prefer the thermoplastic materials partly because any case in the mouth may be regarded as though it were in wax. In other words, the denture may be changed in shape or corrected without a make-over if desired. It may be pressed again to a corrected cast if an error was made in the impression.

The technique about to be described allows a dentist to finish a case with speed. The technique for placing a new base on a denture is so simple that the patient may wait in the office for his teeth if he does not choose to appear toothless in public. This technique was originally intended for use with the pyroxylenes, such as Hecolite, Alcolite, and others; it also lends itself admirably to Resovin and Vydon.

The elimination of wax and moisture in hot oil and the employment of the same medium for pressing the denture is unique besides the convenience it affords in saving time. The oil used in this technique for handling thermoplastics is ordinary motor oil, such as is procured at gasolene stations. I have experimented with many kinds of oil and prefer using the Pennsylvania oils. The highly refined water clear oils, such as are used for intestinal lubricants, work well but the cost is a little more and I see no advantage in their use except absolute freedom from odors.

I am often asked if the oil does not have some effect on the denture. The answer is decidedly that it does not have any effect except that which is desirable. An oil bath is inert chemically and it certainly makes an ideal heating medium. It is also a solvent for the wax since it is a hydrocarbon. Since oil is a good insulator, I make use of this property and allow the oil to come in direct contact with resistance wires so that the heat is picked up immediately by the oil. Little current is needed, quick action is obtained, and the oil bath, and not the vessel is heated. It is probable that cracked and chipped porcelain teeth are avoided because of the tempering effect of the oil and because the moisture is eliminated. As many as a hundred dentures may be pressed in the same oil and the wax incorporated in it. The mixture, of course, solidifies on cooling.

The vessel containing the oil should be about 6 inches in diameter and 5 inches high. The oil should come to the top of the flask and in most vessels this requires about a quart of oil. After a temperature of 212° F. is obtained the moisture starts leaving as steam and the oil foams up, raising the level; hence if a vessel of proper size is not used foaming over will occur.

Other unusual features of this technique are the use of the metal separating plate and also the mechanical means for ejecting the contents of the flask after pressing. In making vulcanite dentures it is easy to remove the denture since the stone or plaster softens in the vulcanizer. In pressing thermoplastic dentures, however, the removal of the pressed denture from the flask becomes a problem.

The separating plate shown in Fig. 8 is a one piece aluminum casting. The plate makes the removal of the denture from the stone easier. When the second half of the flasking is poured, the separating plate is submerged in the stone and pushed down

to the occlusal surfaces of the teeth. Stone is poured over it and it remains in the flask until after the denture is pressed. There is a saving in material accomplished by its use, and it readily comes out when the ejected content of the flask is rapped with a mallet. The ease with which the contents of the flask are removed or ejected mechanically and the denture freed from the stone is only apparent when actually performing the operation. It is a far cry from the old method of cutting, prying, and hammering with all the attendant risk of breakage.

Technique

1. The cast with the case waxed up is mounted in the shallow part of the flask as shown in Fig. 1. This part of the flask is designed with a shallow cup so that the stone will stay in place for the handling in elimination of the wax and getting the blank in position, but it will come free in one piece after the denture is pressed.

2. Wax waste gates are made from the periphery of the base plate to the rim of the flask as shown. Placing these will obviate the necessity for carving waste gates in the hot stone after the case is separated. Any separating medium may be used, but I prefer melting a little wax in a cup and painting it on with a brush. There should be no undercuts, of course, which would allow the second half of the flasking to lock and prevent separation of halves. This is apt to occur on lowers in the posterior portion. Wax may be added to build out sufficiently so that the second half will draw. Wax waste gates also block holes so that the stone is confined.

3. A better understanding of the separating plate may be obtained from inspecting Fig. 2. The cover is then placed on and the nuts tightened to squeeze out excess. A metal-to-metal contact is made between halves. Later this is taken as the proper closure for the flask in pressing the case. In about ten minutes the press may be immersed in the hot oil bath to remove wax and moisture. The wax is taken up by the oil, and moisture is dissipated as steam.

4. If shellac trial plates are used, the flask should be removed from the oil as soon as enough heat has permeated the stone to soften the wax. The case is then opened up, and the plastic base plate removed in one piece before it gets sticky or melts entirely. The part of the flask in which the teeth are held should be placed in a vertical position and any débris swabbed out with cotton.

Fig. 3 shows the case separated and wax removed and a piece of cellophane placed over the teeth. I discovered three years ago, at the risk of ruining a denture, that if cellophane is placed in between the teeth and the blank to be pressed, it may be disregarded for practical purposes after the denture is pressed, and the teeth will still lock properly. Part of the cellophane locks permanently under the teeth, and the remainder is stripped off after it is removed from the flask. The cellophane makes a good surface against which the blank is pressed, and at the same time provides a cushion, thus making removal from the stone less hazardous. The cellophane behaves satisfactorily in

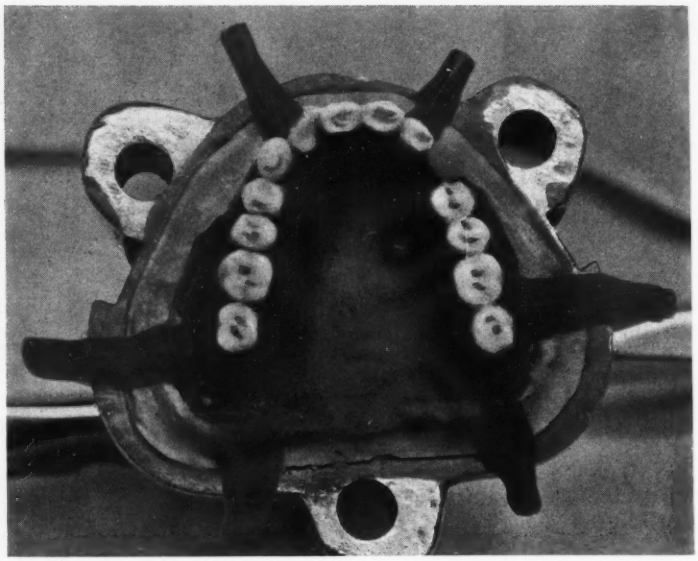

Fig. 1—Case waxed up and flasked in first half. Note wax waste gates. Separating medium of melted wax is applied with brush.

Fig. 2—Second half of flasking. Good quick setting stone is used. The aluminum separating plate shown in Fig. 8 is being immersed and gently pushed down to occlusal plane of teeth. This later facilitates removal of pressed denture from the stone. After the separating plate is immersed, the flask is completely filled with stone, the cover placed on, and the nuts drawn tight.

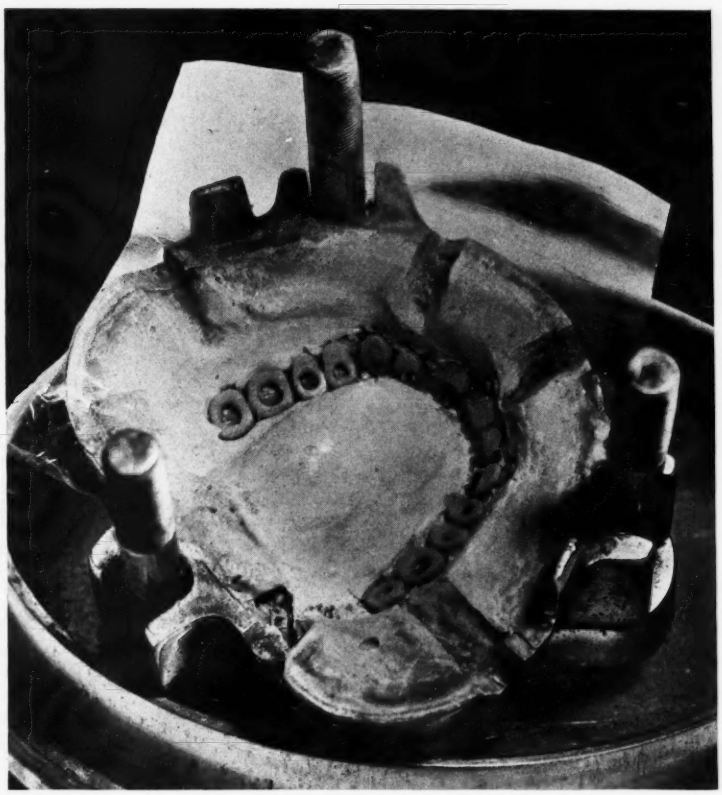

Fig. 3—Case separated and swabbed with cotton. All débris should be removed. A sheet of cellophane is placed over teeth before blank is placed in position.

the hot oil and stretches where stress is brought to bear upon it.

5. The sheet of cellophane already mentioned is placed in position. One should be careful that there are no bits of débris under it and that all teeth are in the proper place (Fig. 3). The blank is then put in place and another sheet of cellophane laid over it. The section carrying the cast is then put in position and the nuts turned down finger-tight (Fig. 4).

6. With the oil bath at approximately 280° F. the press is immersed in it and allowed to stand about five minutes, after which the nuts can be turned down somewhat (Fig. 5).

7. Enough heat should be allowed to permeate the blank so that little resistance is felt in turning down the nuts. The press is removed and placed in a drip pan for inspection and turning down the nuts; then, it is returned to the oil bath. This gives time for the material to flow. The operation of closing the press can be accomplished in less than fifteen minutes, but it is highly advisable to take at least this much time in doing it. When the halves are almost closed with almost metal-to-metal contact at three points, it is advisable to allow the press to stand in the drip pan and follow up to complete closure (Fig. 6).

8. The press is wiped off with a towel and immersed immediately in running cold water. This sounds risky, but I have yet to see any cracked or broken teeth from this drastic treatment. The inner heat is not so rapidly dissipated even by this procedure. It takes about eight or ten minutes to cool the case by this method.

9. At this point the denture should be removed, and this is done mechanically. The nuts are turned almost off, and a flat instrument is inserted to gain a space between the cover and middle section. The ejection plate is slipped into position with the raised portion against the stone. Separation is then made so that half round washers can be inserted. The nuts are then tightened, and the contents of the flask are pushed out with the same action that pressed the denture (Fig. 7).

10. The contents of the flask are pushed out as shown in Fig. 8, and it is only a few more moments until the denture is removed from the stone. The separating plate is removed, which brings the stone at once down to the occlusal plane of the teeth. A few sharp raps with a mallet directed against the buccal in the molar region separates the stone and the outside pieces fall away. The part remaining over the palate or in the lingual area is pried off with a knife, and the denture is entirely uncovered (Fig. 8).

11. In finishing the denture, the waste gates are cut off and the cast is dressed down with coarse sandpaper cones to the periphery. This allows the remainder of the work to be done with the denture on the cast. The

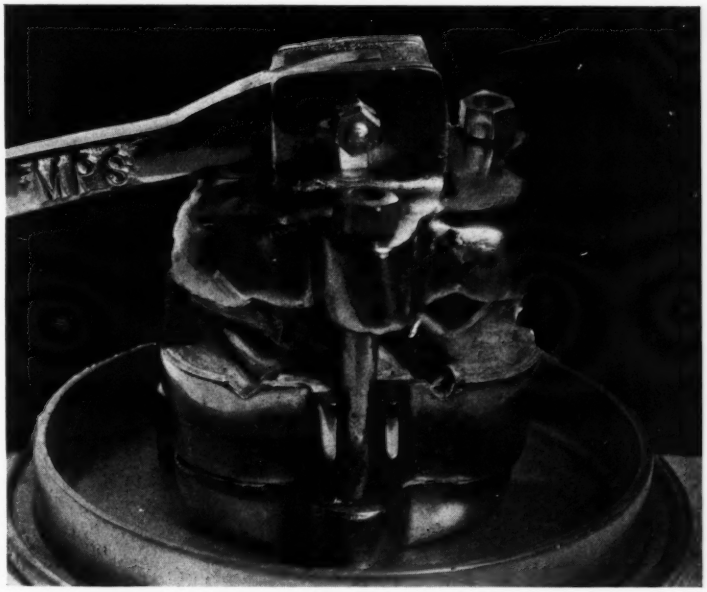

Fig. 4—Press assembled with blank in place. Note cellophane on each side of blank. Ready for immersion in hot oil bath at 280° F.

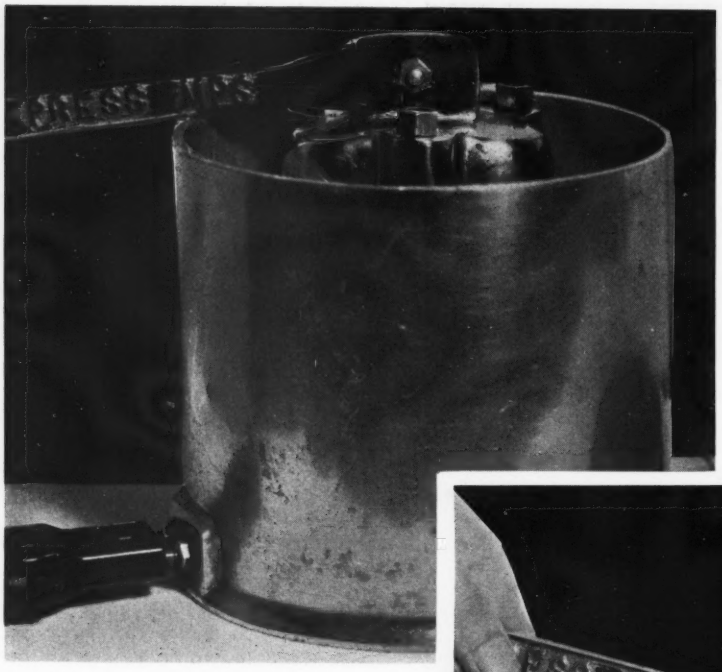

Fig. 5

Fig. 5—Electric kettle for heating the oil. Current of electricity goes through oil. A stew pan and Bunsen burner may be used just as well although they are not as convenient.

Fig. 6—Press nearly closed. This is done in a shallow pan on the bench. Excess material is being squeezed out through waste gates. Metal-to-metal contact should be obtained.

Fig. 7—Contents of flask being ejected mechanically by same force used to press the denture. Ejection plate and spacing washers in position.

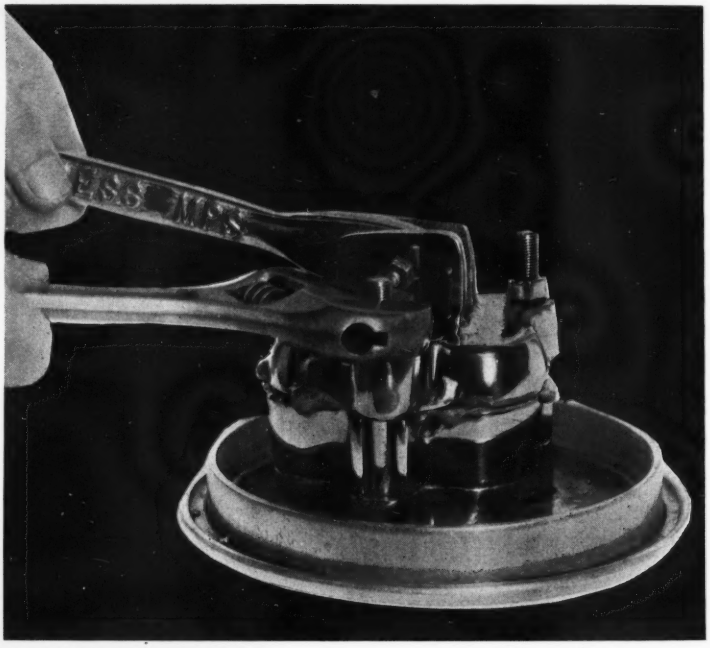

Fig. 6

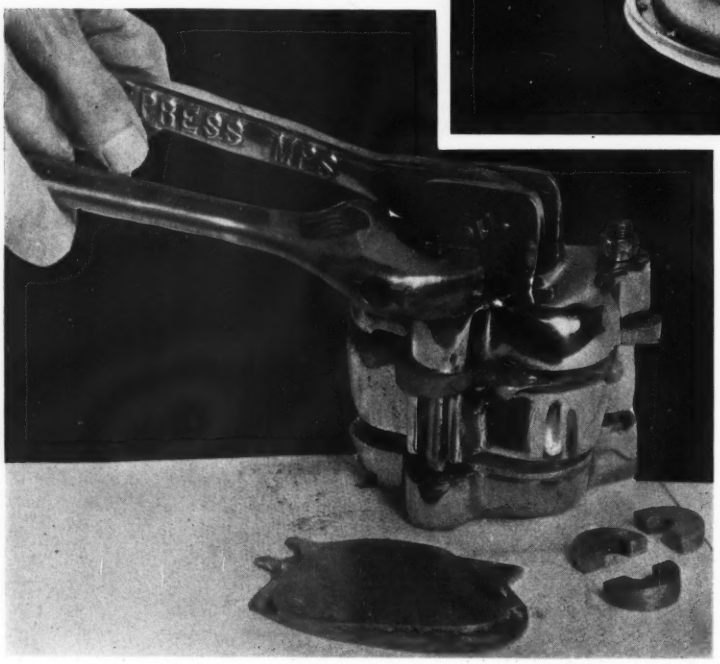

Fig. 7

usual rag wheel, brush wheels, and pumice are used. An inverted cone bur is used to finish down material around the necks of the teeth on the labial. If the waxing has been carefully done, little polishing is required, and it is not an operation that soils the hands or takes a great deal of time. The denture may be removed from the cast, and the cellophane stripped off the tissue side under running water. The denture is then ready to be tried in the mouth. If the patient is not at hand, vaseline should be applied to the denture and plaster flowed into the tissue side and over the palate. The denture is then allowed to remain immersed in a pan of water (Fig. 9).

Advantages

Some of the advantages in the technique just described are (1) ease of operation; (2) extreme simplicity; (3) reduction of time element; (4) accuracy of results; (5) avoidance of cracked teeth; (6) adaptability to needs of the patient, and (7) economy.

Rebasing of Old Dentures

The foregoing technique may be used in rebasing a denture that has been worn. I usually paint melted wax onto the old denture to make necessary corrections.

1. A small paint brush is dipped into a dish of base plate wax heated to the liquid state. This is painted on

Fig. 8

Fig. 8—Contents of flask as ejected, showing how the stone is easily removed from around denture. A rap with hammer removes stone down to separating plate. Separating plate comes off and operation is easily completed. At the right of the illustration is shown a view of aluminum separating plate.

Fig. 9—Completed denture with plaster flowed in it until the placing of the restoration in the mouth.

the old denture where corrections are necessary.

2. When the desired result is obtained, the case is flasked in the usual manner.

3. The case is immersed for about ten minutes in the oil bath at 280° F.

4. The press is opened and the heel of the old base grasped with pliers and gently removed.

5. The loose teeth, if any happen to come loose, are set back. A sheet of cellophane is laid over the teeth; then, the blank of whatever material is used is placed in position.

6. The case is closed down in hot oil, cooled, and opened, and the patient has a new base on the denture.

I have been entirely successful in making repairs with these materials, particularly with the later thermoplastics on the market. In repairing a case, plenty of excess should be used, and the temperature maintained at nearly 300° F. so that materials will fuse properly. Scrap pieces, such as waste gates from previous cases, may be used for this work.

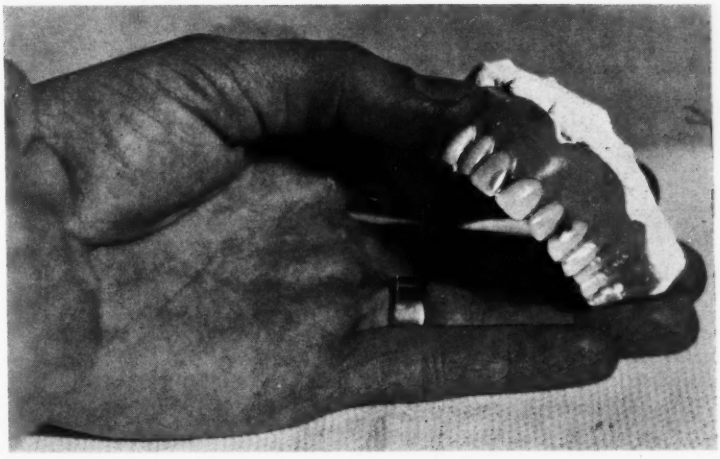

Fig. 9

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The biographies of IRVING SALMAN, D.D.S., WESTON A. PRICE, D.D.S., M.S., F.A.C.D., and C. J. STANSBERY, D.D.S., appeared in previous issues of THE DENTAL DIGEST.

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A COMPLETE FULL DENTURE TECHNIQUE

THIRD OF EIGHT INSTALLMENTS: LOWER IMPRESSION APPOINTMENT AND PREPARATION FOR CHECK BITES

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Los Angeles

1. It will be recalled that the technique describing the upper impression finished with the pouring of the upper cast. Before the lower impression is actually begun some preparatory laboratory work must be done. On this upper cast a snug-fitting base plate is adapted. This is done by dipping the cast in water to prevent the base plate from sticking, and over this moist cast a sheet of base plate material is laid. With a large brush flame from the blow-pipe or inverted Bunsen burner the material is warmed with sweeping strokes until it wilts. Over this heated base plate a damp cloth is laid and the base plate material quickly massaged by hand to perfect adaptation. The margins of this first fitting must now be warmed and turned back or trimmed to conform to the outline of the upper cast. When the margins are correct in extension the adaptation is repeated by rewarming and massaging through the damp cloth (Figs. 22 and 23).

The question is often raised of one's ability to fit base plates with an accuracy sufficient to eliminate errors arising from the variances in form between these base plates and the finished dentures. When the method of adaptation described is used a hair may be laid across the cast under the base plate material and after the fitting the imprint of the hair on the surface of the base plate may be easily seen.

2. On this base plate a modeling compound bite-rim of estimated tooth length and general contour is attached. The bite-rim is flattened and three notches are cut in the occlusal surface, two over the second molar regions and one in the median line. At this time a second base plate is adapted and on it upper teeth of the mold and shade considered proper are waxed up for a try-in. In this wax-up the teeth are arranged to conform to the esthetic requirements of the case at hand. When studied in the mouth one may make further changes to perfect the esthetics. If the patient is one for whom a facial templet has been made, it is used at this time to verify the position of the central teeth (Fig. 5, Installment 1, DENTAL DIGEST, April, 1933). The use of the study cast (Fig. 1) as a model while setting up the teeth in wax will be a help and many times obviate the necessity of extensive alterations in tooth alinement.

The object of a set-up and try-in at this time is obvious. After the selections of size, shape, and shade are made, the upper cast is all that is necessary to make this preliminary set-up; consequently there is no need to postpone this step when the upper cast is at hand. This can best be done at this time, thereby advancing the progress of the work. There is also a possibility that inspection in the mouth at this time may result in the entire selection being changed. There is a certain amount of effort necessary to construct a full upper and lower denture; therefore, the sooner this work is done the sooner the dentures are completed. In 1913, while taking instruction from Doctor Gysi and using his adaptable instrument of that date, I asked the doctor, "How long will it take me to arrange a set of teeth on this instrument?" With his characteristic terseness and discernment, he replied, "Well, that depends on how much you have finished before you begin!" In the set-up

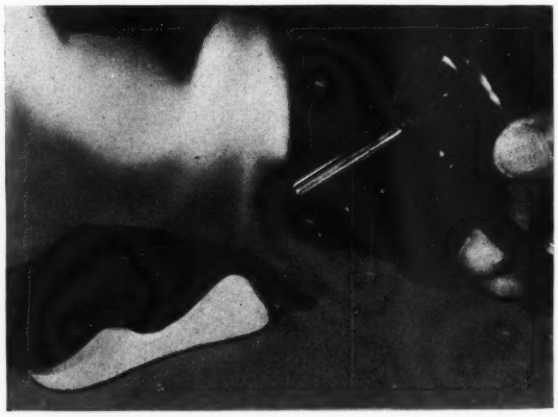


Fig. 22—Use of a small Bunsen burner in wilting the base plate material over a dampened cast.

Fig. 23 — Method of adapting the heated base plate to the cast. The damp cloth distributes the pressure and protects the fingers from heat.

one may be saved many times the time and effort spent in making the records and study casts at the preextraction visit (Installment I).

3. Paragraph 1 of Installment 2 described the making of a cast and vulcanite tray from a lower snap impression; these are now on hand. The vulcanite tray is tried in the mouth and, governed by observation of the tongue movements and manipulation of the cheeks and lips, the margins of the tray are trimmed to avoid all interference; also, undercuts should be removed if present. In brief, the tray is prepared as in relining a lower denture. This tray is lined with modeling compound and an impression is taken of the lower cast so that the modeling compound will be uniformly about 3 mm. thick. The use of this cast will aid considerably in the proper and accurate placing of the vulcanite tray; this is sometimes difficult if done directly in the mouth. The modeling compound is warmed slightly, barely moldable, and seated in the mouth with enough pressure to correct any defect that would cause discomfort under a moderate bite.

If any difficulty is encountered in placing the tray to include a uniform thickness of modeling compound, one may place on it three balls of soft modeling compound about the size of peas, one at each heel and one in the median line. These balls can be seen from all sides to determine the correct placement of the tray over the cast. These modeling compound stops are chilled and the lining is completed by placing rolls of soft modeling compound between them.

4. Attached to the occlusal surface of this vulcanite tray, a modeling compound bite-rim is formed of sufficient height to maintain correct interalveolar space and to occlude with the upper bite-rim which has been notched to receive it. The occlusal surface is warmed and the patient instructed to close with a natural easy bite; he is corrected only if an excessive protrusion is evident. It is best if this is done in two or three steps, at each step warming as uniformly as possible, with the mouth blow-pipe, only the occlusal surface of the bite-rim. This closure may or may not be in centric relation but it will be a closure that the patient can repeat without effort. The registration of centric relation will come later.

Here again the templet is used to check the interalveolar space, the space being left a trifle open, 1 or 2 mm. more than the templet indicates. From this stage on, the upper base and rim and the lower rim are kept as cold as possible by frequently removing and chilling in cold water.

In edentulous cases the height of the lower bite-rim must be left to the operator's judgment in establishing a proper facial length and profile. The reason for leaving the space opened 1 or 2 mm. is that this space will be reduced in the finishing of the ridge impression and the relief of the crest.

5. Again the modeling compound of the lower impression is warmed so as to be *moderately* pliable and the patient is directed to close with *average biting pressure*. A method of warming for this last step is to hold the impression by the bite-rim and dip the lower surface repeatedly into warm water until the desired degree of moldability of the modeling compound is obtained. By "moderately pliable" is meant a degree of resistance to flow that will make it impossible to expose the tray under the "average biting pressure" it must withstand. The impression is now of the bearing surface of the ridge with the pressure greatest along its crest and gradually lessening as the periphery is approached. In cases in which the ridge is firm, large, and well-rounded, and shows no sign of narrow crest tissue nor underlying spinous process this may be accepted as the finished impression of the ridge surface.

If the buccal and lingual surfaces meet at an angle, a groove should be cut along the crest in the modeling compound, 1.5 mm. wide, the tray being exposed beneath. This groove is easily formed with a number 15 excavator, chisel or hoe. The modeling compound is moderately rewarmed and the patient is told to give average biting pressure again. (See Installment 2, step 4, DENTAL DIGEST, May, 1933.) The compound resistance and biting pressure should be so related that the groove is partly closed throughout its entire length. If the groove is fully closed and obliterated, either the modeling compound has been too warm or the patient closed too tightly, thereby losing all that was to be accomplished by this step; that is, to relieve the crest and transfer pressure to the sides of the ridge. If the groove is so closed, another groove is cut and the step repeated with less warmth applied.

Usually the resulting impression shows a complete or partial closure of the groove at some areas while other areas remain unchanged. The groove is remade to a uniform width and the step repeated until an acceptable uniform closure is obtained. This is a demonstration of the various compressible areas exerting equal force on the modeling compound. Also the evident equalization of pressure on the ridges, as indicated by the closing groove, shows that this result has been accomplished in the manner described, as was obtained in the upper impression by the use of the finger seat. When the ridge impression is complete the templet should be an accurate fit, or the facial outline should be as desired.

A slight variation of the technique is necessary for the relief of soft, flabby rolls of tissue on the crest of the ridge which cannot be improved by surgery. This condition is treated as follows:

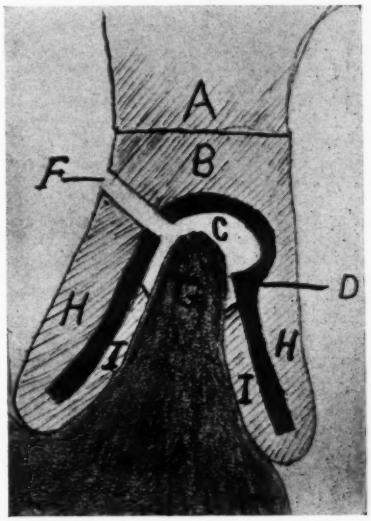


Fig. 24—A, Upper bite-rim; B, lower bite-rim; C, space in groove of vulcanite tray D, from which modeling compound has been removed. Note the outline of the inner surface of the tray caused by flabby crest being crushed over lingually when impression for tray was taken. F, plaster exists to relieve all distorting pressure on the ridge crest G; H, modeling compound buccal and lingual flanges; I, saddle-like bearing surface of impression.

The impression is taken as described except that the groove in the modeling compound is widened to receive the entire flabby ridge so that this tissue may extend freely into this groove when the impression is in place. One should not relieve any portion that is advantageous as a bearing surface. At intervals of 5 mm., with a number 6 bur, holes are drilled in the bottom of this groove through the vulcanite tray and modeling compound bite-rim to the buccal or labial surface (Fig. 24). This enlarged groove is filled with a thin mix of plaster and the impression is placed in its proper position and held firmly with biting pressure while the plaster sets. Excess plaster will escape freely through the holes. If this procedure

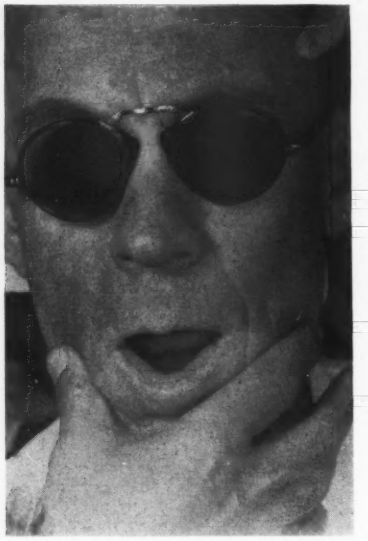


Fig. 25—Starting position of thumb and finger over the lower buccal margin of impression. The mouth is open to show the bite-rim; in practice the rims should be held firmly together.

is necessary it should be deferred to the last step of the impression taking.

6. One buccal margin is warmed from cuspid to heel region, and while the patient holds the impression firmly in position against the upper bite-rim the thumb and finger are placed on either side of the chin with the finger lying directly over this warmed margin (Fig. 25). With light pressure against the cheek raise upward until the finger is over the top of the bite-rim. In this position the cheek is massaged forward and backward.

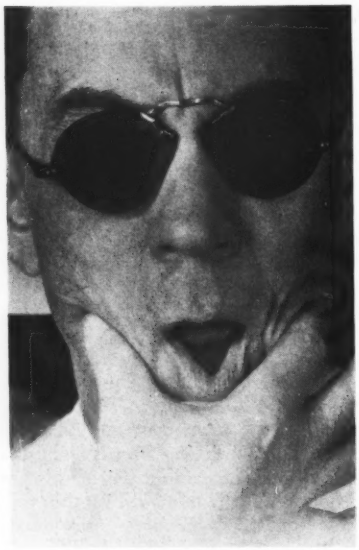


Fig. 26—Second position with finger raised to opposite top of bite-rim. The forward motion in the massage is shown.

Have the patient open, allowing the finger and thumb to press the cheek in between the bite-rims, and continue the forward and backward massage (Fig. 26). The impression is removed and only the margin is warmed. It is then replaced and held firmly, and the patient is instructed to open wide. If this action causes the margin to turn up, the turned up portion is trimmed off and the previous step repeated. The impression is chilled thoroughly and the opposite side treated likewise. This procedure will relieve any undue extension of modeling compound into the buccal pouch, while the vulcanite base plate incorporated within the impression will prevent the impression from being sprung away from the buccal surface of the ridge.

7. The labial portion is warmed, slightly overlapping the finished buccal portions, placed in the mouth and the patient instructed to close to ensure its proper position. The patient then opens, and while the impression is held down firmly with the two first fingers over the bicuspid areas, the thumbs being free, the patient retracts the lip over the incisal portion of the bite-rim. The thumbs and lip are used to massage the soft modeling compound beneath the lip to proper contour (Fig. 27).

This completes the outer margin of the impression and it should show a continuous roll from the buccal to the labial portion. It should lie in contact with the ridge where no movable tissues are attached. It should have all the marginal extension possible but allow full and free movement of the surrounding muscles and attachments.

The object in using a vulcanite tray is to have a nonheat-conducting core for the impression, so that heat will not be carried to previously prepared portions of the impression and permit their distortion.

8. The upper base plate is laid aside while the lingual margin of the lower impression is being formed. By having the patient execute a few well chosen movements of the tongue this can be accomplished with a much better result than can be obtained by any arbitrary manipulation with the fingers. At all times while working with the lingual margin the impression should be held firmly on the ridge with a slight backward pressure. This is done to maintain a snug buccal and labial contact with the ridge. The lingual flange is thoroughly warmed from second bicuspid to second bicuspid, placed in the mouth, and the patient directed to put the tip of the tongue high in one cheek and from

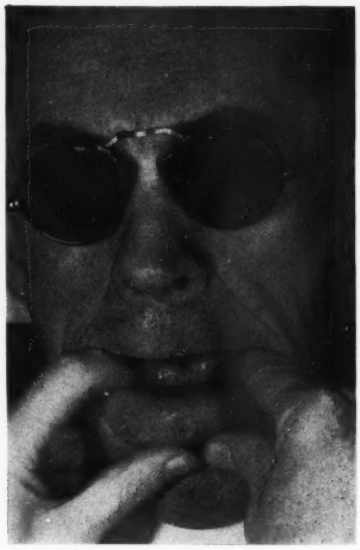


Fig. 27—Forming labial contours and margins.

this position to move the tongue high under the upper lip to the opposite cheek. This movement is reversed and repeated until the modeling compound is too cool for further change. Surplus should be removed and this procedure repeated, with only the edge of the modeling compound flange warmed, until there is no change.

Usually at this stage this portion of the impression is defective inasmuch as the elevation of the tongue has also raised the lingual frenum and adjacent tissues in such a way as to spring the modeling compound away from contact with the lingual surface

Fig. 28—Tongue pressure against the thumb in this position will carry modeling compound into the retromolar region.

of the ridge. To correct this and do it without future irritations developing, the following procedure is used: The impression is chilled and while holding it in position the patient is taught to feel this portion of the impression lightly with his tongue, moving the tongue from one side to the other. The tongue is observed while this is being done. One should be sure to use the word *feel* and not *press*. After the patient has practiced this feeling movement the flange is warmed slightly, only to moldable consistency, the upper base plate is inserted, and the patient is told to close lightly and repeat the feeling movement. This will assure contact without pressure.

9. The remaining portion of the lingual flange presents the most difficulties and it is desirable to proceed with one side at a time. By digital examination one determines whether or not it seems possible to extend the distal of the lingual flange into the retro-alveolar fossa. Modeling compound about the size of a large lima bean is added to the lower margin of the flange; it is warmed well from second bicuspid backward, and while the impression is held firmly with the two first fingers the thumb is placed horizontally over the middle of the occlusal rim and the patient is directed to place the tip of the tongue against the operator's thumb and press forward (Fig. 28). This action will carry the modeling compound downward and backward, obtaining an impression of this important area without arbitrary finger pressure or placement.

The margin form and extension is continued by warming only the edge and using the movements described for the anterior portion of the lingual flange in combination with the tongue pressure against the thumb. The tongue pressure should always be used last. These two movements should be alternated and repeated until there is no movement of the modeling compound edge of the impression. The form of the mandible and the attachment of the tissues may be such that the flange will be molded into a backward, downward, and decidedly outward position—a desirable form for stability of the anterior teeth. If this outward direction is present on both sides the impression cannot be removed without danger of distortion. When one side is finished it is chilled thoroughly and the lingual extension is broken off to facilitate the removal of the impression when the opposite side is taken. The broken off portion is reattached before the cast is poured.

The action of the base of the tongue while the tip is pressing on the operator's thumb is that of expansion laterally to brace itself to deliver the forward pressure. The modeling compound under this lateral placement often presents the appearance of a propeller blade and is trimmed accordingly; the portion to be cut away is evident. If the modeling compound has been too soft it may be necessary to reenforce its thickness on the lingual side. The movement of the tongue under the cheek and lip will shorten this extension and, with a result similar to the one described on the anterior lingual, will tend to relieve the contact of the modeling compound extension in the fossa. The tongue, on thumb pressure, will reestablish its proper contact; that is why the manipulation should end with this pressure.

10. Only the heels of the impression remain to be completed. The upper base plate is replaced in the mouth. Across each heel of the lower a tiny roll of modeling compound, about the size of a match, is laid and moderately warmed. The patient is told to close quickly and firmly and to open immediately. This will form the postdam of the lower impression. The patient is instructed to close quickly and firmly, and immediately open because the pressure on the modeling compound should be relieved before the entire rebound of the tissue has had a chance to expend itself and destroy the postdam effect of this margin. This completes the impression and it is now ready for boxing and pouring, similar to the upper impression. The lower cast is poured with a material, as described for the upper, which will go through the vulcanizing or curing process without change of form or distintegration. When this cast has set, the bases of both upper and lower casts are prepared with index grooves (Fig. 29), and soap is applied to these surfaces for easy removal from the articulator.

11. With the bite-rims as guides the casts are attached to a plain line articulator of rigid construction. The opening screw of this articulator should be securely set to prevent any change of the vertical dimension or interalveolar space. At this time the plain line articulator has on it, with the exception of the upper set-up, the results of all our efforts; namely, (a) upper and lower cast, both finished and on which the dentures are to be formed; (b) a relation of vertical height, subject to correction at the final esthetic try-in; and (c) a relation of closure, which may or may not be a true centric relation, also subject to correction (Fig. 30).

12. The lower impression, which has fulfilled its purpose as an impression, is now to be converted into a lower base plate for check-bite purposes. The lower half of the plain line articulator is submerged in water of such moderate warmth that about five minutes are required to warm the lower impression so that it can be teased off the lower cast. The heels are loosened alternately and reseated at each loosening to maintain their fit to the cast. When separation can be accomplished with no drag the impression is removed and retromolar extensions and any apparent undercuts are trimmed away. While still pliable the impression is firmly reseated. From now on this constitutes the lower base plate; no base plate will fit a cast better than the impression from which the cast was made.

Here again I wish to call attention to a time-saving and precision feature of the technique. The construction of the vulcanite tray takes only a short time and it serves its purpose well in the impression technique. The same tray serves a second purpose, that of lower base plate. Time is saved in the construction of a base plate and the accuracy of its fit is evident and positive. This vulcanite tray base plate in the check-bite technique is to be subjected to the same vertical forces as will be the finished dentures; for this reason the surface in contact with the tissue should be the exact duplicate of the finished dentures. In taking the check bites only vertical pressure is brought to bear on the base plates; therefore nothing will be added to their stability by reproducing the retromolar extensions and undercuts that might be present in the impression.

For a still faster method of vulcanite tray construction than that described in Installment 2, step 1, the second lower cast may be painted with a solution of unvulcanized rubber in chloroform and on this sticky surface is placed a single thickness of rubber. This is pressed down with the fingers until thoroughly attached and the margins are trimmed with a hot spatula. Flask with a single mix of plaster and vulcanize.

13. The base plates and bite-rims are now laid aside and the upper set-up replaced on the articulator. After the manner described for the upper, a base plate is adapted for the lower cast. One should begin the lower set-up by placing the lower anteriors over the ridge and in an arrangement harmonious to the upper anteriors,

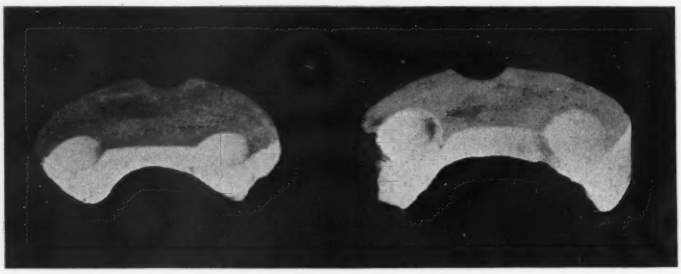


Fig. 29—Grooves of this design are much better than grooves that are hidden when the casts are returned to the plaster attachment.

Fig. 30—Casts with base plates and bite-rims of modeling compound mounted on a plain line articulator.

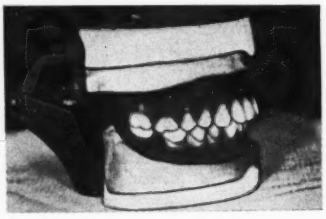


Fig. 31—Set-up, for final verification of vertical height and esthetics.

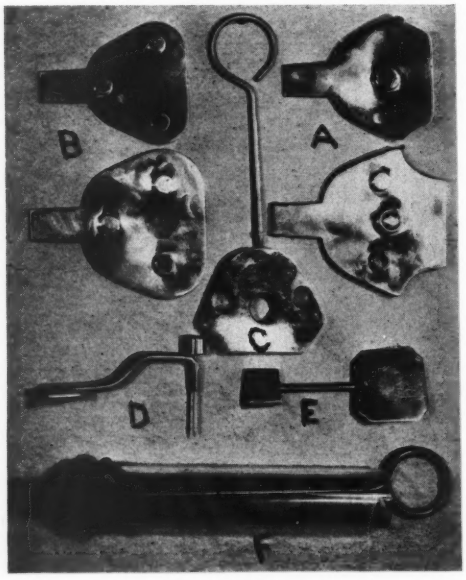


Fig. 32—A, Lower registration plates, the upper one showing the lower side and screw slot; B, upper registration plates; C, heater block, showing the surface that fits the lower registration plates; D, bracket, style holder, and style; E, bracket and graph plate; F, syringe for plaster injection.

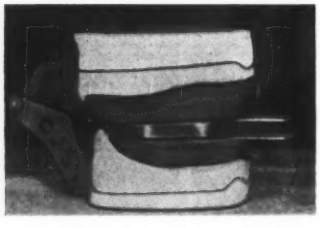


Fig. 33 — Method of attachment of registration plates to modeling compound rims with heater block between them.

which have already been arranged. Any more change than is absolutely necessary in the anterior six of the upper should be avoided because these teeth have been corrected for esthetic arrangement in the mouth. The bicuspids and molars should be in good occlusal contact in the interalveolar space which is being maintained on the plain line by the securely set opening screw. The set-up is to be scrutinized in the mouth at the next appointment for the final determination of its adoption and is now laid aside to await the arrival of the patient (Fig. 31).

14. The base plates and bite-rims are now replaced on the articulator preparatory to receiving the registration plates of the check-bite appliance. The check-bite appliances (Fig. 32) consist of the following:

A. Two lower registration plates of rigid metal, one large and one small, which will be found to answer all needs. The plates are notched at the distal corners to accommodate abruptly rising rami. Each plate has in its center a large threaded stud to carry a screw having a rounded end; on each side of this central stud is a small shorter stud. The screw is threaded in millimeters and its purpose is to measure accurately the increase of distance between upper and lower plates. The two small studs are used for exact replacement of the plaster check bites.

B. Two upper registration plates of corresponding size, each carrying three small studs for the same purpose as the small studs on the lower. All these plates terminate anteriorly in a tapered tongue to receive the sleeve fittings of the style and graph plate brackets.

C. A heater block, the function of which is to carry heat to the registration plates, thereby attaching them to the softened modeling compound beneath. Its use also results in a uniform space between the plates. In the forward edge of the block will be found a small hole for the insertion of a wire handle with which to hold the block over the gas flame.

D. A bracket to slip on the tongue of the upper plate and terminating in a style holder. The style has a sliding fit in this holder and the point of the style rests on the graph plate.

E. A graph plate which is attached to the lower plate by a bracket similar to the upper. The dimensions of the plates and brackets are so proportioned that the central stud is approximately midway between the point of the style and the rotational center of the average patient's man-

dible while making lateral excursions.

F. A syringe for the injection of the plaster between the registration plates (Fig. 32).

The bite-rims are prepared to receive the registration plates by cutting off about an eighth of an inch from the occlusal height of each in order that a space of one-fourth inch will separate them when the articulator is closed. The screw of the lower plate is lowered until the smooth end is flush with the threaded stud. With the slotted end of the screw down, the lower plate is placed on the lower modeling compound bite-rim, the size that fits the rim best being used. The heavy heater block is held by its handle over the gas flame until water placed in the depressions boils away. Care must be taken not to overheat. The heater block is quickly placed on the lower registration plate and in turn the upper registration plate is placed on the heater block. The articulator is closed and held with a slight pressure while the heater warms the modeling compound rims underlying the plates. This allows the articulator to close slowly to the correct interalveolar space and at the same time firmly attaches the plates to the rims (Fig. 33). As soon as the closure is complete, chill, and remove the heater block. At this time the screw lacks a trifle to contact with the upper plate. The lower base plate is removed and with a screwdriver the screw is turned up until contact is made (Fig. 34). The screw is now holding the base plates in the same vertical relation as did the bite-rims in the mouth. The extruded modeling compound is trimmed away from around the edges of the plates.

Removal of the one-eighth inch of modeling compound from the occlusal rims is only a matter of convenience and ensures the placing of the plates with only one application of the heater block. Also there is less tendency for the heated plates to slide sidewise on the softened modeling compound as the articulator is being closed. If this shift or tilting has a tendency to occur, the settling of the plates can easily be guided to correct it. When the heater block is removed and the screw raised to contact the upper, this contact point should be as nearly as possible at the areal centers of the two casts. Here enters into this technique a condition that differentiates it from all check-bite procedures in which bite-rims are used in contact; the central point of contact makes it absolutely impossible for the patient to exert more pressure on one side than on the other, which error is more probable than otherwise when bite-rims in contact are used.

15. The graph plate is prepared by smoking its smooth surface until no sign of the metal shows through; no more than this is necessary and an excessive amount has a tendency to flake off. A cotton roll carrying a few drops of sticky wax or essential oil makes a satisfactory smoking flame for this purpose. While the graph plate is hot a small piece of sheet casting wax is lightly placed on one corner and allowed to flow slowly across the sooted surface. The plate is held on edge and the excess absorbed with a cotton roll. The film of wax should be free of small particles and so thin as to offer no resistance to the movement of the style. The graph plate and style holder are placed on the projecting tongues of the registration plates as in Fig. 35.

The fourth installment of this series, which will appear in the July number of this magazine, is essential to an understanding of this denture technique and should be closely studied by those who are interested in this series. It will describe the verification of vertical height, the accurate determination of centric relation, the positioning of the mandible for eccentric functional relations, and the permanent record of all these for accurate placement on the denture tripod.

(End of Third Installment)

604 Medico-Dental Building.

Fig. 34

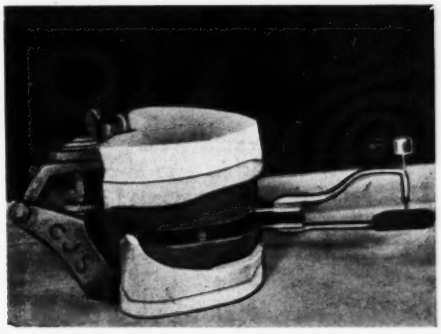


Fig. 35—Registration plates and brackets attached, ready for the patient.

Fig. 34—Shows manipulation of the screw to maintain exact contact with the upper registration plate and preserve inter alveolar space.

THE DENTAL DIGEST AT THE DENTAL CONGRESS

At the Chicago Centennial Dental Congress, opening August 7, THE DENTAL DIGEST'S headquarters will be at Booth 19.

The Editor's Page

ABOUT six weeks after these words appear in print dentists will be assembling from all parts of the world to attend the Chicago Centennial Dental Congress. The week of the Congress, August 7-12, has been designated as Dental Week by the officials of A Century of Progress International Exposition. The World's Fair is in celebration of the centennial of the founding of the city that has risen on the wind swept sands at the tip of Lake Michigan. Once the portage for the French missionaries and voyageurs between the waters of the Great Lakes and the upper Mississippi, later the frontier outpost, Fort Dearborn, now the pulsing city of Chicago—all this in less than a hundred and fifty years.

Dentistry's history is even shorter. Seven years after the founding of the prairie city at the portage, the first dental college was founded in Baltimore in 1840. Four years later, Horace Wells, practicing this new profession in Hartford, Connecticut, discovered the use of nitrous oxide gas as an anesthetic agent. Two years later, in 1846, another practitioner of this new profession, a Bostonian named Morton, successfully demonstrated in the Massachusetts General Hospital the use of sulphuric ether as a general anesthetic. A New England physician, Oliver Wendell Holmes, supplied the term general anesthesia. In less than a decade after the founding of the first dental college two dentists gave to the world the greatest gift in the conquest of pain. This dramatic story of dentistry's contribution to medical science is told by a prominent contemporary American dentist, Doctor Howard R. Raper of Albuquerque, New Mexico. The manuscript of this book, TAKE A DEEP BREATH, has been read with enthusiasm by professional writers and members of the dental profession. The discovery of general anesthesia is the bright and high light in American dentistry's century of progress.

In August of this year practitioners of this young and vigorous profession will meet in the young and vigorous city of Chicago to celebrate the Diamond Jubilee of the Seventy-fifth Annual Session of the American Dental Association. This meeting is to be held in conjunction with the Chicago Centennial Dental Congress. It is fitting that in A Century of Progress Exposition the place of science occupies a central spot. Scientific progress symbolizes this century and the Hall of Science in the fair grounds is the axis about which the activities of the exposition revolve. There the medical exhibits are and among the medical exhibits is the Dental Exhibit, described in *The Dental Scene*, this issue.

In these hundred years of progress Pasteur, Lister, Erhlich, Koch, Walter Reed, Roentgen, Curie—all made their contributions to medical science. One name stands out in this century as the father of American dentistry. In Jacksonville, south in Illinois a couple of hundred miles from Chicago, in the country of Lincoln, Greene Vardiman Black, a dentist, applied a scientific mind and a philosophical understanding to the problems of this new American profession. With an attitude deep-rooted in biologic fundamentals he attacked the particular problems of dental disease and enunciated the principles of the practice of dentistry. In Lincoln Park, Chicago, stands a statue erected by American dentists to the Father of American Dentistry. But more enduring and more important than this product of the sculptor's art are the principles that G. V. Black laid down and to which to this day all skillful dentists subscribe.

It is appropriate that a son of the Father of American Dentistry should be the President of the Chicago Centennial Dental Congress. And be it known that Arthur Black's election to the presidency of this congress was no sentimental gesture to the memory of an illustrious father, no honorary appointment. Every detail of the scientific program of the Congress to be held at the Stevens Hotel, Chicago, has been supervised by Doctor Black, and for the inspiration and ingenuity of dentistry's public exhibit in the Hall of Science the profession can thank Doctor Arthur Black for his untiring efforts, his enthusiasms, and his fine understanding of the manner in which science should be exhibited to the public.

A CENTURY of Progress is being epitomized at the World's Fair in Chicago: MODELS, MOTION, SOUND, COLOR, LIGHT—combined into startling portrayals of scientific achievements, the method in itself an overwhelming application of the scientific principles exhibited. At the risk of seeming bombastic it must be said that a visit to A Century of Progress International Exposition is like no other experience any one has ever enjoyed, although it encompasses the essential good of many experiences. Attempts at individual comparisons all fall short; it is something different or something more than a museum, an amusement park, a foreign café, a walk on the promenade deck of a boat, a possible dream of utopia.

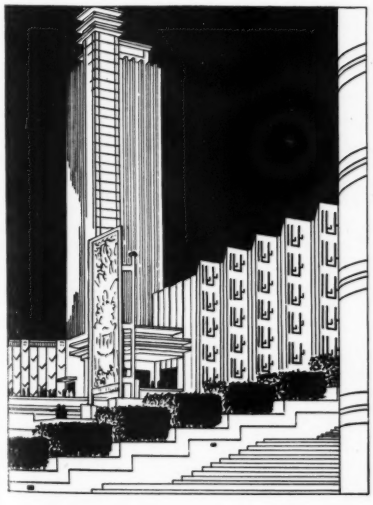
A Century of Progress may be said to have been born under the star Arcturus forty years ago while the World's Columbian Exposition was being celebrated and our elders admired the Child Electricity and began to plan his future. It was at that time a beam of starlight left Arcturus and arrived here in time to be captured by science and made to create the impulse that lighted the exhibits on the opening of Chicago's second World's Fair. And in line with A Century of Progress, we know this is an achievement of science, not magic; and no astrologer foretold the event.

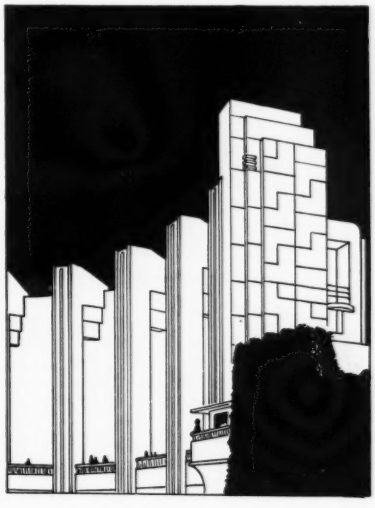
At the request of the President of A Century of Progress Exposition, Mr. Rufus C. Dawes, the Chicago Centennial Dental Congress was organized under the auspices of the Chicago Dental Society and this Congress will combine the Seventy-fifth Annual Session of the American Dental Association and the annual meeting of the Chicago Dental Society which would otherwise have been held in January of this year. This Congress was invited to participate in A Century of Progress International Exposition by developing an exhibit for Dentistry. This noteworthy development will be completed before this issue is in the mails, although at the present writing some of the more spectacular items are unfortunately not yet on display.

The Dental Exhibit has an advantageous location and one impossible to miss in that it is in the principal line of travel of those who enter the Hall of Science and follow through the Great Hall, with its emblazoned inscriptions denoting the humanization of science, past exhibits of the basic sciences of varying degrees of interest, and on to the much publicized Transparent Man in the medical exhibits, which is adjacent to the Dental Exhibit.

To the end that people generally will become interested in healthy mouths a limited number of striking features designed to attract every passerby have been developed instead of showing numerous details which would attract less attention. The exhibit is divided into historical, scientific and educational sections. With the aid of motor-driven mechanical devices, motion pictures, charts, models, transparencies, and actual specimens, the progress of dentistry in the past hundred years is portrayed. Among these features are (1) THE TALKING TOOTH and one similar to it (2) THE PYORRHEA TOOTH. The former is about 9 feet high and 4 feet wide, and consists of a framed ground glass, behind which 1200 small electric lights arranged in an elaborate system of shadow boxes and operated by a new photographically controlled mechanism, and shows the progress of decay in the occlusal surface of a first molar. The molar tells its own story of decay through a synchronized phonograph, and takes occasion to give the audience a number of lessons as to the importance of early care which would have prevented the loss of the pulp and later the tooth itself.

Other features include (3) a turn table with four stages showing the historical PROGRESS OF DENTAL SERVICE since the American cabin days with the itinerant dentist; (4) a TOOTHBRUSHING EXHIBIT, which is a motor-driven hexagonal structure, on each face of which is an aluminum head with accompanying arm, hand and toothbrush. Each of the models demonstrates continuously, as the structure slowly revolves, the proper motion of the toothbrush in a particular position in the mouth, and an explanatory remark is printed beneath each model. The observer may see the six demonstrations by standing in one position for a period of three minutes. (5) MASTICATION EXHIBIT; (6) PROFESSIONAL DENTAL EDUCATION showing by illuminated models the progress in training since





the first dental school was established in 1840; (7) a MOVIE THEATER where a new film requiring twelve minutes to see demonstrates the calcification of the teeth at birth and the gradual development up to 18 years, along with lessons in diet and dental care. For the benefit of children primarily, (8) a DENTAL PUPPET SHOW in which model teeth dressed as puppets demonstrate lessons in diet and care of the teeth; (9) through the cooperation of manufacturers, the progress in dental equipment for the office and also dentally equipped railway cars and automobile trailers, which is a means of bringing facilities to far away districts, are displayed.

"The objectives of the exhibits on health education by the visual and auditory methods are: (1) to compare health conditions of a hundred years ago with those of today; (2) to instruct the public in the intricacy of the living human machine and to give warning not to meddle with it by dangerous self-medication; (3) to interest the layman in the scientific story behind the physician's services and opinions regarding health and sickness; (4) to show that compassion for suffering humanity and not commercialism ruled the lives of the great discoverers and practitioners of medicine."[1]

The dentist who sees the dental and medical exhibit will not be able to refrain from urging his patients who visit A CENTURY OF PROGRESS INTERNATIONAL EXPOSITION to pay particular attention to the story of dental and medical progress as revealed in the Hall of Science. Widespread examination of the Dental Exhibit will result in a marked stride in progress in the movement toward THE EDUCATION OF THE DENTAL PATIENT.

[1]Journal of the American Medical Association, **100**:1512 (May 13) 1933.

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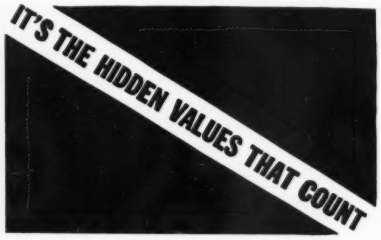

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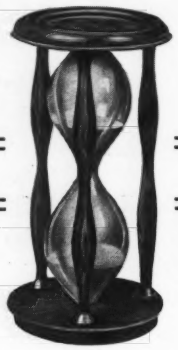

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LETTERS TO THE EDITOR

Agranulocytosis and the Blood Count

In a timely and informative article entitled AGRANULOCYTOSIS by Doctor Samuel Sussman (Dental Digest, April, 1933) appear a couple of statements that seem misleading, arbitrary and erroneous.

With regard to the pathognomonic symptom of leukopenia the author says, "The normal average (leukocytes) is 8000 per cubic millimeter." I question the accuracy of that statement. Biologists and physiologists place the average lower than this. Furthermore, inasmuch as no physiologist with whose works I am familiar places the normal white count higher than 8000, while all give a rather wide range as normal, it appears unwise to name arbitrarily only the maximum as the normal count.

Granting that the normal leukocyte count may at times be as high as 8000, at other times it may be much lower. Macleod (Physiology and Biochemistry in Modern Medicine, St. Louis, C. V. Mosby Company) gives the number of leukocytes in normal human blood as ranging from 5000 to 7000 per cubic millimeter.

Again, many things, such as the quantity and kind of food taken, the time after a full meal, and pregnancy, influence the leukocyte count, so that it is misleading to assume that a count below 8000, or even slightly above that number, is abnormal.

The author of the article referred to further says, "Leukopenia at the outset (of agranulocytosis) is the rule, the total leukocytes being reduced to 1200 or less per cubic millimeter." It might be inferred from this that not until the low count of 1200 is reached would it be symptomatic of agranulocytosis.

It is admitted that when the leukocyte count even approaches so low a figure as 1200 per cubic millimeter, a serious condition exists, but one in which diagnosis usually is not so difficult, and the prognosis always grave. At the same time it should be remembered that any leukocyte count below 5000 per cubic millimeter should be viewed with alarm and recounts made frequently to determine what is happening and in the interests of an early and correct diagnosis.

Undoubtedly Doctor Sussman knows all of this and only failed to make it clear. I am calling attention to it in the interest of a better understanding of the blood picture, in this and other diseases in which the blood count is an important factor, and for the benefit of those not accustomed to making evaluation of the observations in blood examinations.

Later in the article in question, the author speaks of the erythrocyte count as follows: "An important feature . . . is the maintenance of the normal red . . . (5000 per cubic millimeter). This statement is so noticeably erroneous that one can only assume that the error is a typographic one. Possibly the "printer's devil" lost three of the zeros. At any rate, I am told that the lowly position of "printer's devil" was created for the purpose of being "the goat" when anything goes wrong around a printing plant, so place the blame there and let it go at that. The figure should, of course, have been five million (5,000,000) per cubic millimeter.

A. T. Rasmussen, D.D.S.,
La Crosse, Wisconsin.

Answer—Doctor Rasmussen is correct. No deflation in red blood cells should exist. Five million per cubic millimeter it should have been.—Editor

---

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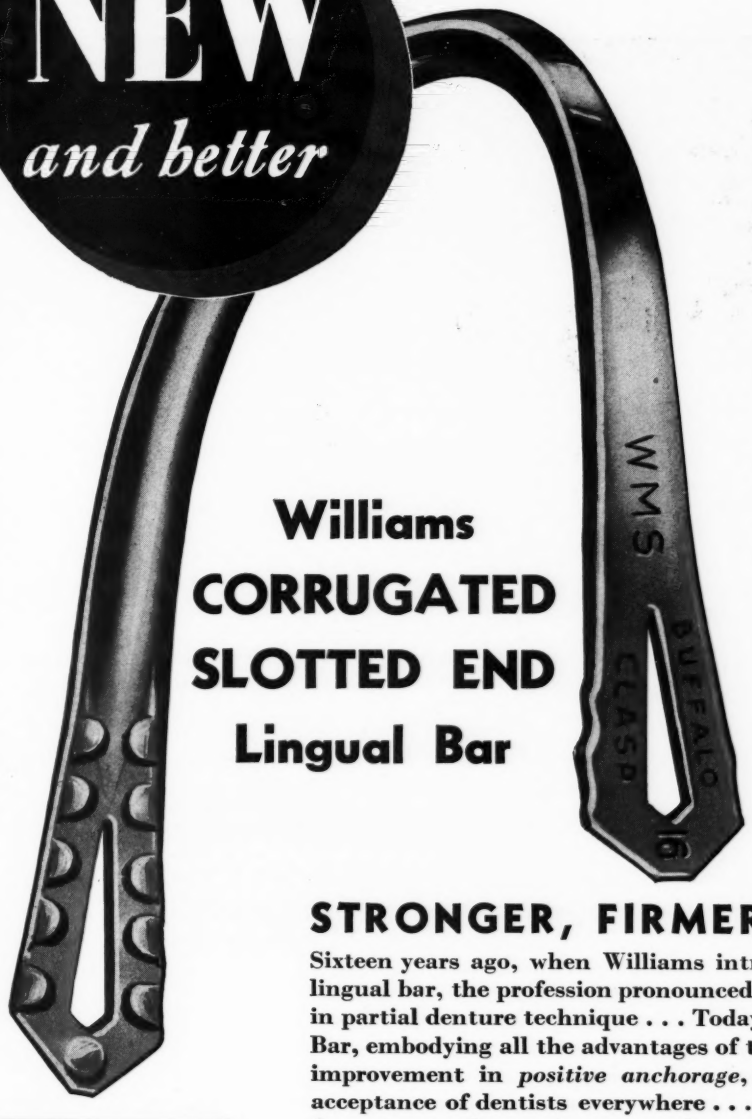

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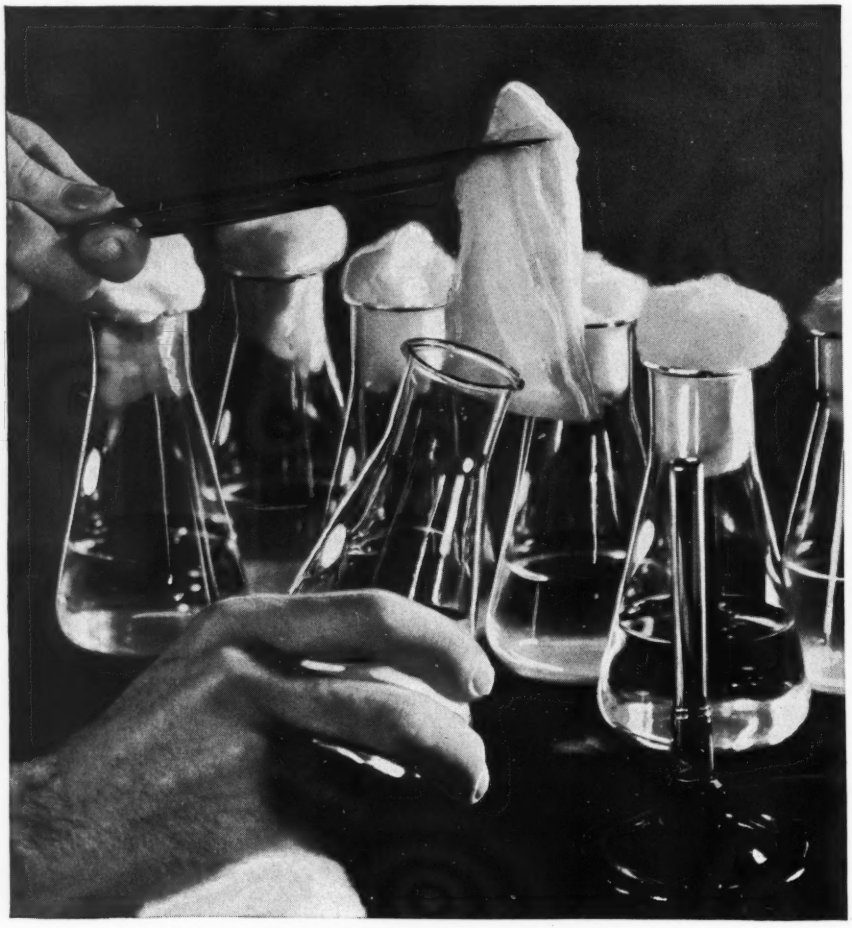

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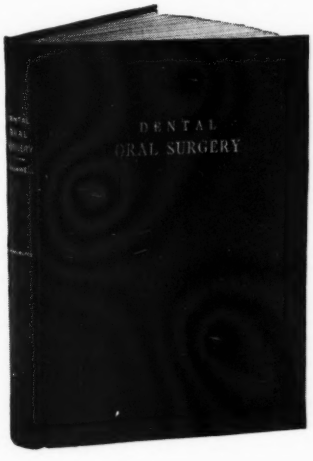

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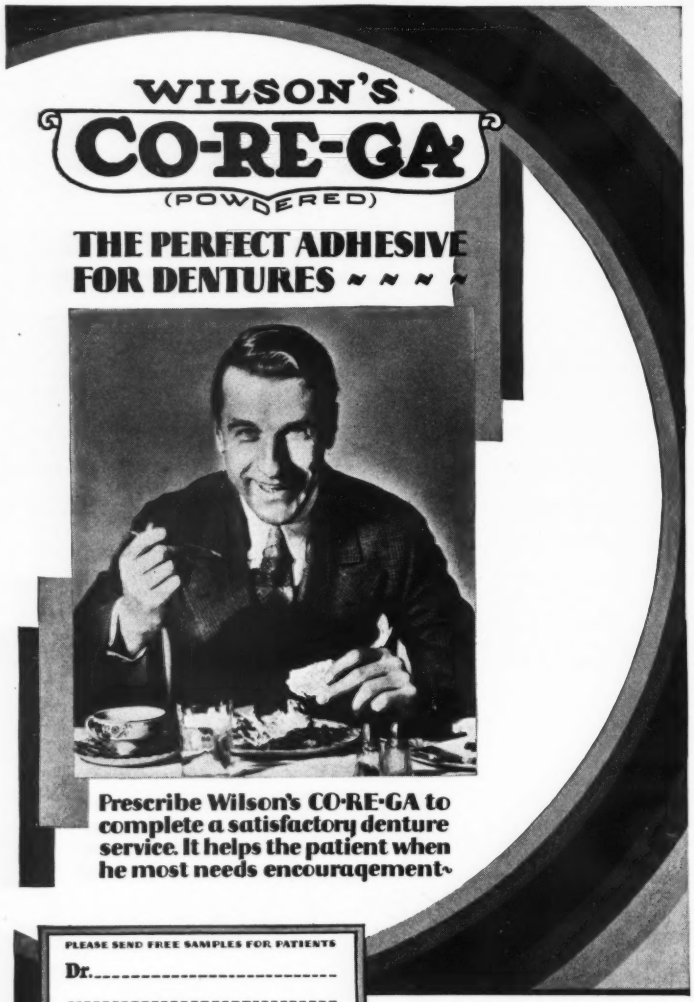
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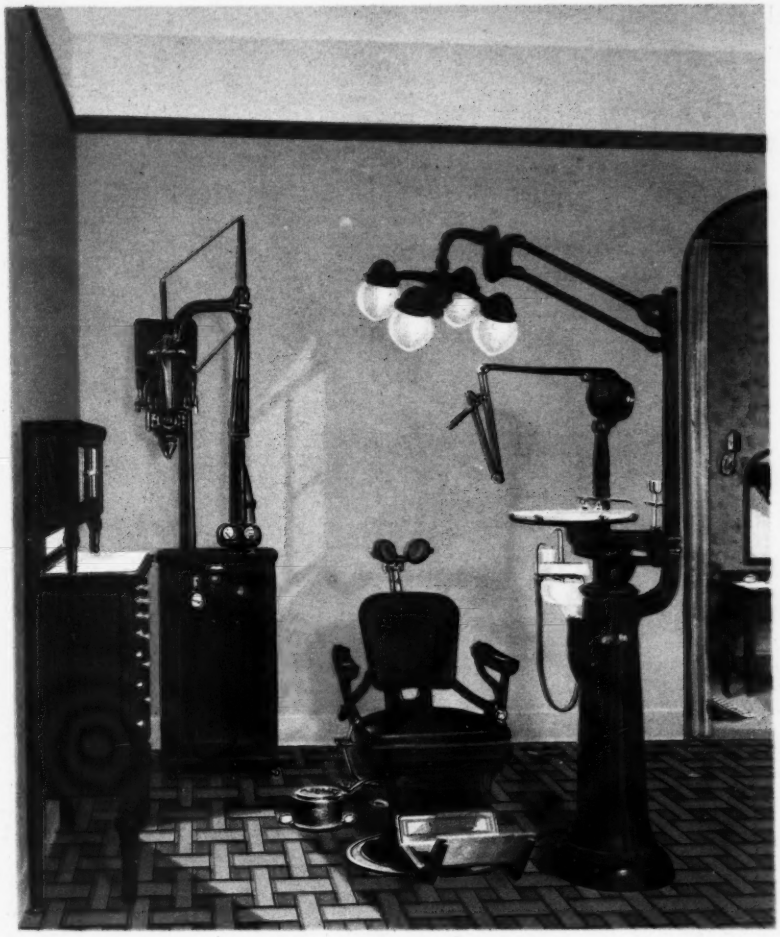

This Outfit $1710

INCLUDING

Victory Chair	$310	Light	$ 55
Nu-Dent Unit	240	Cabinet	225
Engine less handpiece	185	Regal X-Ray	695

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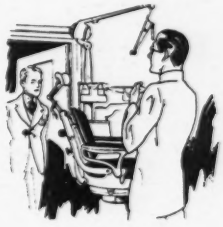
In engineering design and materials used, Weber equipment is constructed to render maximum utility and service.



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Harmony in design and selection of color provide modern beauty, which give the Weber equipped operating room a cheerful, efficient appearance . . . inviting to patients and conducive to greater efficiency.

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Weber equipment is built to the highest engineering standard, yet priced for today's budgets. There never has been as great a value available to the equipment buyer.

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